

# HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews, not by Bureau staff, are by S. C. Pearce, J. Taylor, H. M. Tydeman and M. C. Vyvyan of the East Malling Research Station, by M. E. Scholes and by the staff of the Obstbauversuchsring, Jork.

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## MISCELLANEOUS.

## General.

## 495. WARD, J. M.

**Horticultural investigations [in Australia].***Fruit World, Melbourne*, 1949, 50: 5: 7.

In an address delivered to the Conference of Australian nurserymen in March, 1949, the author gave a brief survey of the most important research projects in progress in Australia, including the following: The selection of citrus bud wood, rootstock investigations on citrus and deciduous fruit, peach and apricot breeding for the Goulburn Valley, and the certification of vegetable seeds.

## 496. HUDSON, J. P.

**Research at Nottingham University.***Fruitgrower*, 1950, 109: 152-3, illus.

Some of the research work recently done at the Midland Agricultural College, Sutton Bonington, is reported. *Pot plant scum*. The development and control of scum on the surface of the soil of pot plants was investigated. It was found that the algae could be controlled effectively by reducing the frequency of watering so as to allow the surface soil periodically to dry out. Frequent watering not only encouraged scum, but also depressed growth in young plants. Tomato and lettuce seedlings pricked out in early summer and watered every fourth day for 3 weeks were well ahead of those watered more often. *Sowing lettuce*. The germination and growth of lettuce seedlings resulting from different methods of sowing varied widely. The depth of sowing may vary from  $\frac{1}{16}$  to  $\frac{1}{4}$  in. but must be uniform within each box. Of the various methods of watering tried, dipping proved most satisfactory and produced a stronger type of plant. *Tomato rogues*. Plumpton King is apt to throw rogue plants that cannot be distinguished at the seedling stage by the usual characteristics. The comparison of plant characteristics at the seedling and later stages has led to the development of a technique for recognizing a proportion of the rogues at a very early stage. *Orchard cover cropping*. Trials with orchard cover crop mixtures emphasize the need for breeding herbage crops especially for this purpose. Timothy grass (S.50) was much more easily cut by the gang mower than Perennial Rye (S.23) even if allowed to get too long. It is probable, however, that Timothy is also too strong growing for the district, which has an annual rainfall of less than 25 inches, especially on light land.

## 497. DE LEEUW-POLAK, B.

**Het beloofde land. (The promised land.)***Fruiteelt*, 1949, 39: 1002-6, illus.

A short account of agriculture and horticulture in Palestine, with particular reference to growing citrus, apples, pears, plums and grapes; peaches, cherries, almonds, olive, bananas, figs and pomegranates are also mentioned.

## 498. TINCKER, M. A. H.

**Agriculture and horticulture.***A.R. Progr. appl. Chem.*, 1947, 32: 347-61, bibl. 111 [received 1950.]

Three pages of this review are devoted to selective weed-killers. The discussion of work on the major

nutrients includes tomato fertilizers. Soil aggregates and organic matter are also dealt with.

## 499. POLLARD, A. G., AND OTHERS.

**Agriculture and horticulture.***A.R. Progr. appl. Chem.*, 1948, 33: 453-91 [received 1950].

The review includes references to the following topics of horticultural interest: The long-term manurial trial with vegetables and small fruits carried out at Long Ashton. The application of fertilizers in solution. The injection of fruit trees to cure mineral deficiencies. The use of growth regulating substances (1) for inducing fruit set, (2) for thinning apples and (3) for reducing pre-harvest drop. Factors affecting vitamin C content in tomato and spinach and carotene content of spinach and carrots. The correction of mineral deficiencies in vegetable and fruit crops. The application of insecticides and fungicides by hydraulic spraying, dusting, mist spraying, and fumigation. The control of plant nematodes. A biological method for determining the herbicidal value of growth substances. Analysis of agricultural and horticultural material.

## 500. TANAKA, T.

**Reconnaissance survey of fruit trees of the world. I. Total number of fruit trees.***J. hort. Ass. Japan*, 1948, 17: 224-30, bibl. 7, being *Commun. hort. Inst. Tokyo agric. Univ.* 1.

"By fruit trees the author means all woody or tree-like plants and large vines yielding fruit or seed, any part of which is edible raw, cooked, processed or preserved for the use of mankind for dessert or culinary purposes." A table shows families (arranged in their orders) with the number of genera, species and varieties of fruit-yielding plants in each family. The extension of the cultivation of some of the fruits to other areas is considered possible and desirable.

## 501. CLAUSEN, R. T.

**Checklist of the vascular plants of the Cayuga Quadrangle 42°-43° N., 76°-77° W.***Mem. Cornell agric. Exp. Stat.* 291, 1949, pp. 87, bibl. 20.

The area covered by this checklist is approximately a rectangle, with Ithaca, seat of Cornell University, at its centre.

## 502. JEALOTT'S HILL RESEARCH STATION (I.C.I.).

**Guide to field experiments 1949.**

Bracknell, 1949, pp. 52.

*Weed destruction*. Very brief notes are given on the uses of Agroxone and Verdene, both of which substances are based on Methoxone (4-chloro-2-methylphenoxyacetic acid), and on *iso*-propyl phenylcarbamate (I.P.P.C.). *Soilless culture*. Seed has been saved annually from tomatoes grown for 5 years in sand without soil or organic matter of any kind. Fruit from plants raised from this seed is being compared with that from normally raised plants for yield, appearance, water content, mineral content, protein, carbohydrates and vitamins. *Pot experiments* include tests of the use of fluorescent lighting.



*Recent developments.*

## 503. NITSCH, J. P.

Obtention de fruits charnus en culture *in vitro*. (The culture of fleshy fruits *in vitro*.)

*C.R. Acad. Sci. Paris*, 1949, 229: 445-6, bibl. 2.

NITSCH, J. P.

Culture of fruits *in vitro*.

*Science*, 1949, 110: 499, bibl. 2, illus.

Hitherto, attempts to induce the development of ovaries of detached flowers cultured *in vitro* have resulted in failure. In these two notes Nitsch describes his success with flowers of the tomato variety San José cultured in nutrient medium. Several media, liquid and solid, were tested for this purpose. That of Gautheret, used in a modified form, did not produce ovary development, but when the juice of green or red tomatoes was added the ovaries began to enlarge after about 8 days and developed into small tomatoes that ripened normally. The growth curve obtained was the same as that for tomatoes attached to the plant. The fruits were parthenocarpic. In some cases roots developed on the flower stalk, but only in the dark; root development also occurred in the media which contained no tomato juice. The action of the tomato juice has not yet been fully determined, but the fact that small tomatoes were also obtained from an entirely synthetic medium containing  $\beta$ -naphthoxyacetic acid is significant. It is proposed to extend these investigations to other fruits. [The work was done at the California Institute of Technology, Pasadena. A fuller paper, possibly in the *American Journal of Botany*, is promised.]

## 504. SQUIRES, P., AND SMITH, E. J.

The artificial stimulation of precipitation by means of dry ice.

*Aust. J. sci. Res., Ser. A. phys. Sci.*, 1949, 2: 232-45, bibl. 6.

An article describing experiments carried out near Sydney, in which supercooled water clouds were "seeded" with ice crystals by dropping pellets of solid carbon dioxide into them from an aeroplane and the effect noted. In 15 out of 20 trials precipitation is believed to have resulted. [Such work is obviously of great potential interest to horticulturists.]

## 505. TICQUET, C. E.

The future of soilless culture.

*Agriculture, London*, 1950, 56: 538-41.

The development of soilless culture, especially that during the war years, is reviewed. Owing to the high cost of installation, the author considers that large-scale commercial development in this country in the near future is unlikely. Extension is now largely in the hands of amateurs. In tropical and semi-tropical areas, however, especially where substantial white populations live in areas of poor or pest-ridden soil, or at stations along remote air routes, prospects for the industry are great.

## 506. PENNINGSFELD, F.

Naturboden, Kunsterde und Hydrokultur. (Natural soil, artificial media and hydroponics.)

Reprinted from *Bayer. Gärtnerverband*, June, 1949, pp. 3, bibl. 6.

Experiments are in progress at the horticultural institute, Weißenstephan, to compare the "Degussa" method of plant culture (see *H.A.*, 19: 1745), which uses pumice stone as a rooting medium, with actual hydroponics and with plants grown in ordinary glasshouse soil. First results, although achieved with primitive equipment, show a marked increase in ripe tomatoes for the two soilless culture methods. It is suggested that the reduction of the root system, that takes place in conditions of ideal nutrition and aeration, benefits the development of leaves and fruits. On the other hand, small errors may have drastic consequences.

## 507. DAHL, E.

A new apparatus for recording ecological and climatological factors, especially temperatures, over long periods.

*Physiol. Plant. Copenhagen*, 1949, 2: 272-86.

A new type of apparatus for recording temperatures over long periods has been constructed. A photographic plate is subjected to radioactive radiation, and the illuminated spot is moved as a function of temperature. If the apparatus is placed under varying temperatures one may after a certain period develop the photographic plate. By photometer measurements the temperatures that occurred during the registration period are found, and the duration of each temperature interval is given. The same principle may also be used, with slight modifications, for recording other factors than temperature. [Author's summary.]—Oslo University.

## 508. MULDER, D.

Het colorimetrisch bladonderzoek. (Colorimetric methods for leaf-analysis.) [English summary 10 lines.]

*Meded. Dir. Tuinb.*, 1949, 12: 810-20.

The value of colorimetric methods of leaf-analysis, their value for advisory service and teaching, and the effect of variation in method on the results, are discussed in three chapters, the last with J. Oele as collaborator. A simplified method, for the use of horticultural teachers and advisers, is described.

## 509. HARMSSEN, G. W., AND LINDENBERGH, D. J.

Investigations on the nitrogen nutrition of plants. I. A new method for the determination of nitrogen-requirements of soils:

*Plant and Soil*, 1949, 2: 1-29, bibl. 7.

The rate of liberation of mineralized nitrogen from its organic form in humus is measured by the new method described—Microbiological Laboratory of the Zuiderzee Reclamation Works, Kampen, Holland.

## 510. ZELLER, A.

Faktorielle und quasifaktorielle Experimente in ihrer Bedeutung für landwirtschaftliche Versuche. (Factorial and quasi-factorial trials in their importance for agricultural research.)

*Veröff. Bundesanst. alpine Landw. Admont*, Vienna, 1949, Heft 1, pp. 77-90, bibl. 10.

A lucid account in German of modern methods of experimental design and analysis, in particular those mentioned in the title, but without particular reference to horticulture. [Fuller accounts of all the methods are available in English.] J.T.



*Growth substances and growth.*

(See also 498, 535h, 563, 597, 640, 774, 777-796e, 850, 851, 854, 868, 869, 895-897, 1083.)

## 511. CHOUARD, P.

Les progrès récents dans la connaissance et l'emploi des substances de croissance. (Recent progress in our understanding of the nature and use of growth substances.)

Reprinted from *Rev. int. Bot. appl.*, 1948, No. 307-8, pp. 189-203; No. 309-10, pp. 316-27; No. 311-12, pp. 427-52; No. 313-14, pp. 529-54; and 1949, No. 317-18, pp. 138-56; No. 319-20, pp. 252-96, bibl. over 900.

After the publication of recent surveys on the subject yet another might appear redundant. This, however, is not so, for M. Chouard approaches the subject from a somewhat different angle. He is more concerned with the physiological than the horticultural aspect, more with the causes than the applications of growth substance effects, although both these aspects are considered. The survey is, in fact, divided into 2 parts, the first dealing with the properties and mode of action of growth substances, and the second with the use of growth substances in horticulture. In the latter the application of hormones to the rooting of cuttings, marcottage, transplanting, grafting, the production of parthenocarpic fruit, the prevention of fruit drop, ripening of fruits, prolonging dormancy, stimulation of seeds and selective weeding are discussed in turn. The author indicates which practices are still only in the experimental stage and which are commercially applicable. Methods of application are summarized, but no detailed experimental results are given. The excellent bibliography of over 900 references is arranged according to subject matter.

## 512. FERNIE, L. M.

The use of growth substances in horticulture.

*E. Afr. agric. J.*, 1949, 15: 100-2, bibl. 3.

Notes on *Technical Communications* 12, 18 and 20 published by this Bureau, all of which review work done on plant hormones. Points relating to crops or weeds occurring in East Africa are singled out for mention.

## 513. MITCHELL, J. W., WIRWILLE, J. W., AND WEIL, L.

Plant growth-regulating properties of some nicotinium compounds.

*Science*, 1949, 110: 252-4, illus.

Six related nicotinium compounds have been found to possess growth-regulating properties when tested on bean plants. These were parachlorobenzylnicotinium chloride, 2,4-dichlorobenzylnicotinium chloride (2,4-DNCI), 3,4-dichlorobenzylnicotinium chloride, orthochlorobenzylnicotinium thiocyanate, benzylnicotinium bromide, and orthochlorobenzylnicotinium bromide. These compounds brought about a reduction in stem elongation without typical gall formation or other form changes commonly resulting from treatment with other growth substances. 2,4-DNCI was the most effective,  $\frac{1}{2}$  mg. per plant, applied to the stem in lanolin paste, greatly inhibiting elongation of seedlings grown in darkness and, to a lesser degree, of illuminated ones. All the compounds brought about a significant increase

in stem diameter of illuminated plants. The most effective methods and times of application were investigated. In preliminary experiments the following coal tar derivatives were found to bring about similar responses: 2,4-dichlorobenzylpyridinium chloride, 2,4-dichlorobenzyl-2-picolinium chloride, 2,4-dichlorobenzyl-3-picolinium chloride, and 2,4-dichlorobenzyl-4-picolinium chloride.—Bur. Pl. Ind., Soils, agric. Engng, Beltsville, Md.

## 514. GUSTAFSON, F. G.

Tryptophane as an intermediate in the synthesis of nicotinic acid by green plants.

*Science*, 1949, 110: 279-80, bibl. 9.

By supplying tryptophane artificially to leaves of cabbage, broccoli and tomato, it was demonstrated that these plants do synthesize the vitamin, nicotinic acid, from tryptophane. Light was apparently not a factor in this synthesis. It was incidentally observed that when 4-5 in. tips of tomato plants were put in high concentrations of tryptophane, the young, immature leaves showed unmistakable signs of response to growth hormones. It is suggested that the plant tips had synthesized a growth hormone from tryptophane.—University of Michigan, Ann Arbor.

## 515. ROHRBAUGH, L. M., AND RICE, E. L.

Effect of application of sugar on the translocation of sodium 2,4-dichlorophenoxyacetate by bean plants in the dark.

*Bot. Gaz.*, 1949, 111: 85-9, bibl. 9.

No evidence was found that Na(2,4-D) was translocated out of destarched bean leaves in the dark, unless sugar was added to the leaves. The application of sugar to the leaves of destarched plants, which were subsequently treated with Na(2,4-D), resulted in stem curvature and inhibition in growth of the trifoliate leaf blades. Such effects were not apparent when sugar was not applied. Fructose and glucose were significantly more effective than sucrose in augmenting the translocation of the growth-regulator. [From authors' summary.]—University of Oklahoma.

## 516. DAVIS, E. A.

Effects of several plant growth-regulators on wound healing of sugar maple.

*Bot. Gaz.*, 1949, 111: 69-77, bibl. 18, illus.

Six growth-regulating substances (3-indolebutyric acid, *o*-chlorophenoxypropionic acid, 2,4-dichlorophenoxyacetic acid, *p*-chlorophenoxyacetic acid, traumatic acid and glutathione) were tested for their ability to stimulate wound healing in sugar maple (*Acer saccharum*). Glutathione at 50 and 100 mg./g. [talc was found to have a stimulating effect, but the other compounds at the concentrations tested were ineffective. It is thought possible that this stimulation may be due to the presence of the -SH group in glutathione. Although glutathione is too expensive to be used commercially, it is suggested that other -SH-containing compounds might be of practical value for incorporating in wound dressings.—Yale University, New Haven. [See also *H.A.*, 19: 2780.]

## 517. GOLDACRE, P. L.

On the mechanism of action of 2,4-dichlorophenoxyacetic acid.

*Aust. J. sci. Res., Ser. B, biol. Sci.*, 1949, 2: 154-6, bibl. 4.



The rate of destruction of indole-3-acetic acid by a crude enzyme preparation from etiolated pea epicotyls is increased by 2,4-dichlorophenoxyacetic acid. A natural inhibitor present in boiled onion juice opposes this increase. A mechanism is suggested for the action of 2,4-D on the growth of plants. [Author's summary.]

518. RANDHAWA, G. S., AND HAMNER, C. L.  
The effect of antibiotics and growth regulators on germination of several seeds with special reference to actidione.

*Indian J. Hort.*, 1949, 6: 3/4: 1-5, bibl. 2.

Wheat, radish and bean seeds were soaked in a solution containing 9 antibiotics, other than actidione, in a total concentration of 100 p.p.m. No inhibiting action on germination was found, but when actidione at 5 p.p.m. was added, the inhibiting effect was much more pronounced than when actidione was used alone. Mixing the nine antibiotics, other than actidione, with three growth regulators each at 10 p.p.m., resulted in a moderation of the action of the growth regulators.

519. MININA, E. G.  
The significance of growth in determining sex in plants. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1949, 69: 93-6, bibl. 12, illus.

The order of development of staminate and pistillate flowers in monoecious plants is discussed in relation to nutrition and illustrated by the cucumber and by Japanese persimmon (*Diospyros kaki*) in which there is a tendency for male flowers to develop on the lower, early formed, parts of the branches and the female flowers on the more distal parts. The results indicate that in such flowers the sex depends on the age of those tissues which produce them. Favourable conditions of growth, increasing metabolism, favour the development of female flowers.

### *Chemical and physiological phenomena.*

520. TEWFIK, S., AND STUMPF, P. K.  
Carbohydrate metabolism in higher plants.  
II. The distribution of aldolase in plants.  
*Amer. J. Bot.*, 1949, 36: 567-71, bibl. 10.

The widespread occurrence of aldolase in plants has been demonstrated [by a chemical examination of 29 plants including many vegetables]. Since its presence is so ubiquitous, it may be assumed that this enzyme participates in one of a series of enzyme systems involved in the phosphorylytic cleavage of sugars in plants. In the leaf cell aldolase was found only in the cytoplasmic fraction and not in the chloroplast bodies. Finally it appears in highest concentrations in actively growing parts of plant tissues. [Authors' summary.]—University of California.

521. STUMPF, P. K.  
Carbohydrate metabolism in higher plants.  
III. Breakdown of fructose diphosphate [FDP] by pea extracts.  
*J. biol. Chem.*, 1950, 182: 261-72, bibl. 15.

In the enzymic breakdown of FDP in plant tissue, the enzymes aldolase, isomerase, triose phosphate dehydrogenase, enolase, phosphotransferase, and carboxylase have been demonstrated to be involved. The results indicate that in pea seeds the fermentation of FDP is apparently similar to that in yeast and animal tissues.

[Author's summary.]—University of California, Berkeley.

522. VEGIS, A.  
Einfluss der Aufbewahrungstemperatur auf die Aktivität der Knospen nach beendeter Winterruhe. (The influence of the storage temperature on bud activity after completion of the dormancy period.)  
*Physiol. Plant. Copenhagen*, 1949, 2: 117-30, bibl. 21.

The experiments were carried out at the University of Uppsala with winter buds of the water plant, *Stratiotes aloides*.

523. ARNON, D. I., AND WHATLEY, F. R.  
Is chloride a coenzyme of photosynthesis?  
*Science*, 1949, 110: 554-6, bibl. 6.

From a study of the photochemical evolution of oxygen by chloroplasts isolated from sugar beet and spinach, Warburg and Lüttgens\* concluded that chloride was a coenzyme for photosynthesis. Their evidence was as follows. Isolated chloroplasts lose their capacity for oxygen evolution after several washings in water. They can be reactivated by the addition of cytoplasmic fluid, chloride or bromide. Iodide and nitrate were less effective, and fluoride, sulphate, thiocyanate, phosphate and all the cations were tried without effect. Chloride was thus the only anion found in cytoplasmic fluid in sufficient concentration to be effective. The question of whether chlorine is therefore an essential element for plant growth was left unanswered. In order to investigate this further, the authors of the present paper grew sugar beet and chard in nutrient solutions without chloride. They found that the intact plant is able to carry on normal photosynthesis without chloride either in the nutrient medium or in the leaf tissue. Chloroplasts isolated from the same plant, however, did require chloride for vigorous evolution of oxygen. In explanation they put forward the hypothesis that some cellular substance essential for the photochemical evolution of oxygen by chloroplasts undergoes rapid light deterioration once the cell is broken, and that chloride or bromide is able to protect this substance from inactivation. In the intact cell, protection is accomplished in some other way.—University of California, Berkeley.

524. ROSENE, H. F., AND WALTHALL, A. M. J.  
Velocities of water absorption by individual root hairs of different species.  
*Bot. Gaz.*, 1949, 111: 11-21, bibl. 8.

Rosene's micropotometric technique [see *H.A.*, 14: 442] was used to determine the velocity of absorption of Hoagland's solution at a pH of ca. 5 by individual root hairs of ten species. Experiments were performed with the seedlings in moist air at different temperatures ranging from 19° C. to 30° C. The mean velocities of absorption by the root hairs within a species calculated in cubic micra per square micron of hair surface per minute were: barley, 0.3; oats, 0.5; wheat, 0.5; Chinese cabbage, 0.7; Georgia collard, 0.7; mustard, 1.2; maize, 1.7; radish, 2.0; tomato, 2.3; and field pea, 4.4. Fluctuations in the velocity of absorption by individual root hairs from one 10-minute interval to another were observed, but no definite periodicity

\* Warburg, O., and Lüttgens, W., *Biochimia*, 1946, 11: 303.



was noted. These fluctuations were independent of temperature changes. Small gradual temperature changes appeared to have no effect on the velocity of absorption by an individual root hair during any one experiment. The results demonstrated that in any study on absorption by individual root hairs the age and length of each hair and the extent of the immersed area, as well as temperature, are important variables. [From authors' summary.]—University of Texas, Austin.

525. BAUMANN, H.

Die konstitutionelle Anpassung der Kulturpflanzen an die Wasserversorgung. (Constitutional adaptation of water requirements to water supply in cultivated plants.)

Z. PflErnähr. Düng., 1949, 46: 176-90, bibl. 9.

Observations and experiments on potatoes and cereals suggested to the author the theory that the water requirements of a plant are determined by the water supply during its juvenile stage. During this period, which in the potato lasts till the formation of the first tubers, the plant's "constitution" is assumed to develop. In the light of this hypothesis drought resistance is a character acquired in the struggle for water in the early phases, abundant supplies and deficiencies making for a hygrophytic and xerophytic constitution respectively. The view is supported by field and pot trials which show that yields are largely independent of water supplies during the growing season once the initial adaptation has taken place. [Neither anatomical structure, nor physiological aspects of the problem, such as osmotic properties and rate of transpiration, were studied.]—Berlin University.

526. TURNER, J. S., AND HANLY, V. F.

Succinate and plant respiration.

New Phytol., 1949, 48: 149-71, bibl. 23.

Succinic acid, adjusted to various pH values with potassium hydroxide, has been applied to thin tissue slices of the carrot root and the subsequent respiratory behaviour has then been followed.—The Botany School, Univ. of Melbourne.

527. SEN, P. K.

Effects of mineral deficiencies on rooting of cuttings.

Indian J. Hort., 1944, 2: 88-94, bibl. 9 [received 1949].

Five treatments were applied to cuttings of *Justicia gendarusa* Linn. planted in sand:—Complete nutrient solution, solutions omitting N, P and K, and water only, minor elements being included except in the last named. When these cuttings had grown, and characteristic deficiency symptoms were apparent in all but the complete nutrient, a further series of tip cuttings was taken and planted in sand with water only, half of them being treated with indolebutyric acid and the remainder left untreated. Results were as follows: Omission of N reduced shoot growth markedly, but significantly increased the root: shoot ratio; omission of P reduced shoot number but did not affect the root: shoot ratio; omission of K increased shoot number and decreased the root: shoot ratio, but the effects were not significant. Application of indolebutyric acid promoted root formation to a significant

extent, the effect being apparently most pronounced where N was deficient.

528. ROWAAN, P. A.

Les dégâts par le sel et le chlore aux différentes cultures. (The injurious effects of salt and chlorine on various crops.)

Maandbl. LandbVoorlicht. Dienst, 1948, 5: 280, abstr. in Rev. Agric. Brux., 1948, 1: 712-13 [received 1950].

Investigations on the effect of high salt concentrations in the soil on various plants gave many apparently contradictory results, which led to the conclusion that factors other than concentration may contribute to the injurious effects of salt. Some of the most sensitive crops are listed. These include tomatoes, radishes, lettuce, cucumbers, chicory and salsify; gooseberries, cherries, raspberries, plums, glasshouse grapes, red currants and apples; begonias, dahlias, lilac and young rose bushes.

529. ANON.

Radiation effects on plants minimized by AEC reports.

Seedworld, 1949, 65: 11: 24.

Experiments recorded in the Semi-annual Report of the Atomic Energy Commission indicate that reports of the growth-promoting effects of atomic radiation on plants are unfounded. These tests made by the United States Department of Agriculture on 17 different crops "revealed neither benefits nor damage to crop growth and yields from the radioactive materials applied". In additional tests, in which the reactions of vegetables and flowers to a much wider range of radioactivity were observed, no beneficial effects were noted.

530. BURRIS, R. H., WILSON, P. W., AND STUTZ, R. E.

Incorporation of isotopic carbon into compounds by biosynthesis.

Bot. Gaz., 1949, 111: 63-9, bibl. 11, illus.

With simple equipment it is possible to biosynthesize  $C^{14}$ - or  $C^{13}$ -labelled compounds by growing plants in a closed system. Satisfactory methods of so doing, suitable containers for the plants, and devices for generating and adding carbon dioxide are described. The methods have been tested in the preparation of labelled starch from bean leaves, labelled isocitric and malic acids from *Bryophyllum calycinum*, and malic and citric acids from tobacco.—University of Wisconsin, Madison.

Practical devices.

531. REA, H. E., AND MEEK, W. E.

A two-row tractor mounted multiple fertilizer distributor for row crop field tests.

Agron. J., 1949, 41: 541-2, bibl., illus.

This tractor equipment developed by the Texas Agricultural Experiment Station and the Mississippi Delta Branch Experiment Station, and used successfully for factorial fertilizer experiments in 1948, permits the application of 3 separate fertilizers simultaneously with planting.



532. GIESE, H., AND HENDERSON, S. M.  
Farm fence end and corner design.  
*Res. Bull. la agric. Exp. Stat.* **364**, 1949,  
pp. 45-119, bibl. 11, illus.

Field surveys of farm fences show that many are in poor condition. The end construction is a critical factor in the successful performance of a fence. The study herein described was undertaken to find the causes for failure, to appraise the relative value of common construction methods and to attempt to devise better ones. Particular attention has been given to labour-saving in the hope that knowledge of improved methods would result in more satisfactory construction on the farm. [From authors' summary.]

533. ANON.  
New easy to fit tree tie.  
*Fruitgrower*, 1949, **108**: 1098, illus.

The "Kuma" tree tie, a non-corrosive aluminium tie, fitted with a protective rubber pad, is described and illustrated. The tie can be adjusted to fit any size of tree or stake, takes less than a minute to fix, and, it is claimed, holds the tree firmer than cord or sacking can do.

534. BOJARINCEV, F.  
Irrigation with underground waters. [Russian.]  
*Kolhoznoe Proizvodstvo* (Collective farming), 1948, No. 11, pp. 37-9, illus.

In some parts of U.S.S.R. the only sources of water, for domestic use and for agricultural and horticultural irrigation, are underground. The author describes the construction of wells in such regions with special reference to a form with a "gravel and wire" filtering system (shown diagrammatically).

#### Noted.

535. a ANON.  
The preparation of wood for microscopic examination.  
*Leaflet D.S.I.R. Forest Prod. Res. Lab.* **40**, 1949, pp. 8, illus.
- b BURSTRÖM, H.  
Studies on growth and metabolism of roots.  
I. The action of *n*-diamylacetic acid on root elongation.  
*Physiol. Plant. Copenhagen*, 1949, **2**: 197-209, bibl. 7.  
On wheat roots at the Botanical Laboratory, Lund.

- c DIXON, R. D., AND MURPHY, M. M.  
Fence post preservation by the cold-soak method.  
*Circ. Ga Exp. Stat.* **161**, 1949, pp. 8, illus.
- d GAMMON, N., JR., AND FORBES, R. B.  
Determination of calcium on soil extracts and plant ash by chloranilic acid.  
*Analyt. Chem.*, 1949, **21**: 1391-2, bibl. 7.
- e MÄDE, A.  
Agrarmeteorologie und Pflanzenschutz.  
(Agricultural meteorology and plant protection.)  
Reprinted from *Zeitfragen PflSchutz*, 1949, pp. 11.  
A general survey of the subject.
- f MAHESHWARI, P.  
On the longevity of pollen.  
*Indian J. Hort.*, 1944, **2**: 82-7, bibl. 22 [received 1949].  
A review of the literature.
- g MERFIELD, A. G.  
Cloche gardening and its importance to New Zealand.  
*Orchard. N.Z.*, 1949, **22**: 9: 8-12.
- h RAMAN, K. R.  
Methods of inducing seedlessness in fruits.  
*Indian J. Hort.*, 1949, **6**: 3/4: 11-15, bibl. 10.  
A review of the literature.
- i REINDERS-GOUWENTAK, C. A.  
Homogeneous and heterogeneous rays: their characteristics and a key for their identification.  
*Meded. LandbHoogeschool Wageningen*, 1949, **49**: 215-36, bibl. 17, illus.  
An anatomical study of medullary rays.
- j VAN DER VEEN, R.  
Induction phenomena in photosynthesis. I.  
*Physiol. Plant. Copenhagen*, 1949, **2**: 217-34, bibl. 15.
- k WAGENKNECHT, A. C., AND BURRIS, R. H.  
Indoleacetic acid inactivating enzymes of bean roots and pea seedlings.  
*Arch. Biochem.*, 1950, **25**: 30-53, bibl. 10.

### TREE FRUITS, DECIDUOUS.

#### General.

(See also 495, 497, 499, 533, 1158, 1177, 1178, 1198.)

536. OSMOND, D. A., AND OTHERS.  
A survey of the soils and fruit in the Vale of Evesham 1926-34.  
*Bull. Minist. Agric. Lond.* **116**, 1949, pp. 128, illus., 5s.

This survey is one of a valuable series of fruit/soil surveys made in various fruit-growing parts of the country. The series, which includes\* "Fruit-growing

\* Also one on West Cambridgeshire, see *H.A.*, 3: 436.

areas on the old red sandstone in the West Midlands" [*Bull. Minist. Agric. Lond.* **15**, 1931], "Fruit-growing areas on the Lower Greensand in Kent" [*H.A.*, 4: 692], and "Fruit-growing areas on the Hastings Beds in Kent" [*H.A.*, 19: 1754], covers a wide range of soils and crops, and demonstrates clearly the relationship that exists between soil conditions and the growth and performance of the various classes of fruit. At the same time it reveals the profound influence that soil conditions exert on the fruit-growing industry of a given area. The material is arranged in the same way as before, a description of the geology of the district and of the various soil series being followed by an



account of the local fruit industry, including a short history of its development and a detailed review of the extent, methods of culture and varieties of the different fruits grown. These 2 sections are then related in a discussion of the growth features exhibited on the different soil types and series, and of the problems to which each soil series gives rise. It is evident that the system of soil classification used offers a sound basis for advising on fruit-growing problems. Practical recommendations are summarized in the conclusions. Chemical data on plant material obtained from several soil series, and a useful soil series map of the Vale are appended. It is unfortunate that publication of this survey had to be delayed for 10 years, but the information has partially been brought up to date by footnotes. [See also *H.A.*, 19: 915.]

537. DE WIT, W.

Oppervlakte en productie van de Nederlandse fruitteelt vóór 1940 en ná 1945. (Acreage under fruit in Holland before 1940 and after 1945.)  
*Meded. Dir. Tuinb.*, 1950, 13: 8-12.

Acreages under the various fruits and yields in Holland are tabulated. The acreage under fruit has increased by about 1,200 ha. per year during the last 10 years, almost 60% being with apples.

538. BAUDEWIJN, J.

La culture fruitière au Limbourg. (Fruit-growing in the Province of Limburg.)  
*Rev. Agric. Brux.*, 1948, 1: 904-8 [received 1950].

A survey of the state of fruit-growing in the Belgian province of Limburg, showing the rapid development of the industry during the last 25 years, and concluding with recommendations for improved standards of grading and packing, more efficient pest control and a careful selection of varieties, if the home and export markets are to be maintained.

539. VANDERHASSELT, P., AND SCHEYS, —.

Les sols de la région fruitière du Limbourg. (The soils of the fruit-growing district of Limburg.)  
*Agricultura*, 1947, p. 257, abstr. in *Rev. Agric. Brux.*, 1948, 1: 89 [received 1950].

In the seemingly homogeneous loess deposits of the Limburg region the authors have distinguished a dozen different types of soil profile, created by the processes of erosion of top soil and eluviation of the chalk and clay particles. By a study of these soil profiles in relation to their fruit-growing possibilities, sites specifically suitable for the chief varieties of cherries, pears and apples have been discovered. A survey of 100 local orchards showed that the majority of these were not planted on the most suitable soils, although many such soils existed in the area.

540. SCHWEIZ. ZENTRALE F. OBSTBAU, OESCHBERG.

Die Schaffung zweckmässiger Obstanlagen. (The establishment of fruit plantations [in Switzerland].)  
[Publ.] *Schweiz. Zentrale f. Obstbau, Oeschberg*, 1949 [?], pp. 16.

In central and eastern Switzerland fruit trees are still largely scattered over fields and pastures. The

brochure is a well illustrated plea for the establishment of fruit plantations as monocultures and for their proper care.

541. RAO, U. N.

Regional peculiarities in apple production.  
*Indian J. Hort.*, 1947, 5: 8-17 [received 1949].

A general account of practices found in the different apple growing regions of India, of which Kashmir is the biggest as well as offering the greatest opportunities for expansion. Features discussed include climate, soils, varieties, propagation, orchard practices and yields. Under propagation, it is noted that seedlings from wild local apples are commonly used as stocks with variable results, shield budding being generally adopted, except in the Nilgiris where, despite repeated trials, it has not been possible to obtain more than about 50% success with it. In this area whip grafting, giving nearly 100% success, is generally used.

542. BUZZI, L.

Pfirsich-Kultur im Tessin. (Peach culture in Tessin.)  
*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 121-4, illus.

The article is a brief account of the experimental peach plantations recently established at Trevano, near Lugano, Switzerland. The trees are trained according to the open centre system of Martinoli, with 4-5 leaders, the crotch being about 80 cm. above soil level. The Italian system, whereby peaches are treated in the same manner as vines, is also being tried. Amsden, J. H. Hale and Elberta are the varieties grown, as they have proved most suitable for this area.

543. BLIGH, R. D. L.

Pear growing in the Annapolis Valley.  
*Publ. exp. Farms Serv. Dep. Agric. Canada* 824, 1949, pp. 17, illus., being *Fmrs' Bull.* 156.

Material extension of the recently developed pear growing industry in the Annapolis Valley of Nova Scotia is favoured by many factors. The climate is suitable. Owing to the relatively low summer temperatures, fire blight, a destructive bacterial disease, is practically unknown. Good sites and soils exist. There is a ready market for fresh fruit in the Maritime Provinces, and there is still a good demand for pears by the canning industries. Clapp Favourite [*sic*], the standard early pear, attains a quality and firmness in the Annapolis Valley that is unequalled in any other pear growing district of America. Brief notes are given on the cultivation requirements of pears and on the commercial varieties that have proved successful in this district. Clapp Favourite and Bartlett are the two standard varieties, and there is also a limited local demand for Flemish Beauty, Clairgeau, Anjou, Seckel, Sheldon, Dana Hovey and Bosc. New varieties, some of them promising, that have been tested at Kentville, are described.

544. ROLFE, W. A.

Fig growing in Southern Victoria.  
*J. Dep. Agric. Vict.*, 1949, 47: 512-13, illus.

White Genoa and White Adriatic are the chief varieties of fig grown in private gardens in Victoria, while Black Genoa (possibly a local name for Black Ischia)



is the chief commercial variety. Notes are given on situation, propagation, pruning, pests and diseases, irrigation, fertilizers, harvesting and marketing. Cuttings are preferred to suckers for propagation, as the tree produced from a cutting is less liable to sucker than one grown from a sucker. Shield budding or cleft and bark grafting can be practised.

*Varieties and breeding.*

545. POTTER, J. M. S.  
National fruit trials 1945-1947.  
[Publ.] roy. hort. Soc. Lond., 1949, pp. 32.  
In 1945 frost damage at Wisley was considerable. Very early warm weather was followed by disastrous frosts in late April and early May. Observations confirmed the belief that susceptibility to damage is in direct ratio to age of fruitlet. Some Bramley's Seedling and other apple varieties which produced some blossom on the 1-year wood and also much foliage on the young wood gave a crop. Cropping in 1946 and especially in 1947 was better. Descriptions are given of the characters of the selections under trial at Wisley or, in the case of cherries, at Borden, including the following:—the John Innes seedling apples, plums and cherries; pears, Gorham from N. York and Bristol Cross from Long Ashton; strawberries, Perle de Prague and Auchincruive No. 9 [=Climax] and 12 of Boyes' Cambridge seedlings; raspberries, new varieties and Seedling 8475 from East Malling and two Milton seedlings which have been grown at Wisley for the last ten years without deterioration; red currants, Red Lake from N. York; black currants, 10 varieties laid out in trial in 1944. A useful appendix assesses the criteria for judging the suitability of strawberry, raspberry and black currant varieties for jam manufacture.

546. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.  
Tree fruits. Varieties of apples, pears and plums suitable for growing in Scotland.  
Adv. Leaflet, Dep. Agric. Scot. 10 (n.s.), 1949, pp. 8, 4d.  
Notes are given, not only on suitable varieties and their chief characteristics, but also on rootstocks for apples.

547. VERNER, L.  
The possible value of the Idared and Idajon apples in the Pacific Northwest.  
Proc. 45th ann. Mtg Wash. St. hort. Ass., 1949, pp. 164-6.  
Since 1910 the University of Idaho has grown nearly 12,000 apple seedlings to fruiting; from these nearly 100 have been selected as promising, but so far only 4 are considered good enough to name and introduce. Of these 4, the 2 best are here described briefly. Both are dessert apples, seedlings of Jonathan × Wagener; Idajon ripens 10-14 days before Jonathan and Idared 10-14 days after it.

548. MILEŠKO, A. F.  
Mičurin's varieties of apple and pear in the Crimea. [Russian.]  
Sad i Ogorod (Orchard and garden), 1949, No. 12, pp. 12-15.  
Tree shape and fruit characters of a number of Mičurin's varieties of apple suitable for growing in the Crimea are

described. Varieties resistant to scab are mentioned and some are stated to be winter-hardy. Notes are given on pear varieties with special reference to Bere zinnaja (Winter Beurré).

549. THAGUŠEV, N. A.  
The principal Circassian pear varieties. [Russian.]  
Sad i Ogorod (Orchard and garden), 1949, No. 10, pp. 28-30, illus.  
Of the five best known Circassian pear varieties the two most valuable are Hutemy and Deilekuž which are here described and illustrated. Among other characters Hutemy possesses resistance to frost, drought and wind damage, while no insect or fungal injury has been observed on Deilekuž.

550. MARKOV, N. V.  
New Alma-Ata varieties of plum. [Russian.]  
Sad i Ogorod (Orchard and garden), 1949, No. 11, pp. 16-20, illus.  
Plum breeding experiments at the Kazah (Kazakh) State Agricultural Academy are described. Attempts were made to obtain varieties with quality not inferior to that of Reine Claude Althan but more tolerant to unfavourable conditions, and preserving varieties with Greengage quality but more tolerant and fruitful. Crosses were made between various species and varieties, and seed was also obtained from open-pollinated trees. After selection the seedlings were planted out and some of them subjected to the influence of mentors. Eventually 7 varieties were retained; these are described and illustrated.

551. MAURER, K. J.  
"Gehlhaars Frühzwetsche"—eine frostfeste Zwetschensorte. (Gehlhaar's Frühzwetsche, a frost-resistant damson variety.)  
Dtsch. Garten, 1949, 60: 20: 3.  
The new Zwetschen variety, a description of which is given, is a seedling of Pauline Schleiter, ripening in the second half of August. Flavour, cropping and other characters were found satisfactory in preliminary tests at Geisenheim, and trials by growers are recommended. O.J.

552. MUSTAFA, A. M., AND GINAI, M. A.  
Apricot growing in Baluchistan.  
Indian J. Hort., 1944, 2: 9-28, bibl. 13 [received 1949].  
Twenty-four varieties of apricot found growing in Baluchistan are described with a table showing blossoming dates and relative resistance to frost damage. Five of them are white-fleshed and appear to be distinct from the existing botanical varieties of *P. armeniaca*. The name var. *alba* is suggested for this type of apricot, which appears to be intermediate between *P. armeniaca* and *P. mume*. Propagation is usually done by budding on seedling apricot stock, the Shaghali variety being recommended for the purpose. Spacing recommended for orchards of half standard trees is about 24 feet with various stone fruits interplanted as fillers and cut out after about 10 years. Pruning is not generally practised in the area, but has been found desirable at the Fruit Experiment Station, Quetta, where its main objects have been to obtain trees of the desired shape with open centres, and, by thinning out laterals and fruit spurs, to provide adequate



light and encourage continual renewal of fruiting wood and spurs. Other points discussed briefly are manuring and irrigation, picking and packing, and diseases and pests. The possible extension of apricot growing is discussed.

553. BALAŠOV, P. K.

**Kamyšin apricots.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949,

No. 12, pp. 20-1.

Among the species of fruit plants studied at the Kamyšin (Kamishin) observation centre (on the R. Volga in the Saratov province) are some seedling trees (second and third generations) raised from wild apricots. They show wide differences in colour, flavour and size of fruit, and in time of ripening. The variation ranges from trees with the characters of the wild forms (small, hard, bitter fruits), to others more closely resembling the cultivated varieties. The characters of four types are tabulated. Differences are also shown in the degree of resistance to collar rot. It is suggested that, by breeding from resistant forms, susceptibility to this disease may be eliminated.

554. MANN, A. J., AND KEANE, F. W. L.

**Breeding new cherries.**

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*,

1949, pp. 77-9.

Two new sweet cherry varieties, Van and Star, raised at the Dominion Experimental Station, Summerland, B.C., are described. They represent the most promising from among 21 seedlings originally selected as of possible commercial merit.

555. GUKASJIAN, A. S.

**Figs and pomegranates in southern Kazakhstan.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949,

No. 10, pp. 46-8.

In Kazakhstan there are many regions with a mild climate suitable for the cultivation of subtropical fruits including figs and pomegranates. The chief characters of 6 varieties of fig and 7 of pomegranate are tabulated.

### *Propagation and rootstocks.*

(See also 527, 1160, 1161, 1164, 1165, 1167.)

556. NEDERLANDSCHE ALGEMEENE KEURINGS-

DIENTST VOOR BOOMKWEKERIJGEWASSEN.

*N.A.K.B. Nederland.* (The Netherlands

General Inspection Board for Arboriculture.)

*N.A.K.B.*, The Hague, 1949, pp. 20, illus.

All propagating material of the important tree and small fruits and roadside trees in Holland must now come from certified parent plants only. Moreover, no nursery tree may be sold that has not been inspected, certified and labelled by the N.A.K.B. The object of this drastic compulsory certification scheme was to ensure the health and purity of strain of scion and rootstock of trees supplied by nurserymen. The scope of this original inspection has now been extended to include inspection for quality, a fact that has greatly stimulated the use of good cultivation practices. In this pamphlet the aims of the N.A.K.B., the scope of its activities, and its methods of inspection and certification are briefly set out. The valuable work done by the Board on the classification of cherry and peach varieties is worthy of note.

557. ANON.

**Peach pit tests.**

*Amer. Nurserym.*, 1949, 90: 10: 58-60.

A preliminary report on experiments made at the New York Agricultural Experiment Station to determine the effect of dry storage on the viability of seeds and growth of seedlings of the peach variety Lovell, a variety used as a seedling rootstock. Newly harvested pits showed a considerably higher rate of germination and germinated earlier than pits that had been stored for 1 or 2 years. Autumn sowing gave a better stand of seedlings than spring planting of after-ripened, sprouting seeds.

558. OZEROV, G. V., AND KOSAREVA, JU.

**Methods of hastening the germination of olive seeds.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949,

No. 12, p. 45.

The germination of olive seeds is long delayed unless the stony shell is mechanically injured. An experiment is described in which olive seeds (1) had their tips removed with pointed pincers, (2) had the whole shell removed, (3) were left uninjured (control). In 15 days, when counts were made, the seeds with tips removed had germinated 61%, those with the whole of the shell removed 72%, and the controls 7%. Removing the tips, being a simple and time-saving operation, is recommended.

559. MARKOV, N. V.

**The influence of the mentor in raising new plum varieties.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949,

No. 12, pp. 15-17.

Experiments carried out at the Kazah (Kazakh) scientific agricultural research institute are described. (1) A seedling of Transparent Reine Claude had round-oval, light yellow, early ripening fruit. To increase its fruitfulness Victoria was worked on it as mentor. Two years later it ripened 15 days later, and its fruit was oval, rose-pink and larger, the results being attributed to the influence of the Victoria mentor. (2) Another seedling, a hybrid of Burbank × Black Apricot, with smooth dark-skinned but light-fleshed fruit, was grafted with Black Apricot as mentor. In the second year afterwards the flesh of the fruit was distinctly darker and more like that of the Black Apricot parent and mentor. In other experiments the mentor had no noticeable effect on the seedling variety.

560. LUGEON, A.

**Contributions à l'art de la greffe. (Contributions to the art of grafting.)**

*Rev. romande Agric. Vitic.*, 1950, 23: 8-10, illus.

A student's error led the author to discover that trees headed back in winter do not require further cutting back to the fresh wood before grafting. The usual technique is regarded as wasteful both from the point of view of the tree, which has already begun to form a callus over the wound, and from the point of view of the nurseryman who saves time and labour. Figures are not given, but it is stated that the "take" leaves nothing to be desired; on the contrary callus formation is completed much earlier and the fixing of the scion is easier in dry wood than in fresh tissue. The method seems particularly suitable for the grafting of young



apple trees, but promising results were also obtained with walnut. Two photographs illustrate the technique and another the graft union in a walnut tree.

561. SHERRED, P. R.

**Root-grafting of deciduous fruit trees for Kumaon and Garhwal.**

*Indian J. Hort.*, 1944, 2: 29-33, illus. [received 1949].

The method described is whip or tongue grafting, using as stocks seedling plants, layers, or sections of roots bearing rootlets. Both stocks and scions are collected and stored in a shed during December-January and grafting is done from mid-December to mid-February. Grafts are sealed with clay, horse and cow manure in equal proportions, and are planted out by mid-February with the graft union just below soil level. On transfer to the orchard own roots from the scion can be cut off, or alternatively, if own-rooting is desired, the stock root can be cut off, own-rooting being encouraged by deeper planting. As rootstocks, apricot is recommended for apricot; plum for peach, European plum or Japanese plum; and peach for peach or Japanese plum.

562. KATYAL, S. L.

**Effects of intermediate stem-piece and its physiological application particularly in temperate zone fruits.**

*Indian J. Hort.*, 1949, 6: 1: 36-44, bibl. 33.

A review of the literature on the use of intermediates in double working deciduous fruit trees, with special reference to apples.

563. MOLOTKOVSKIĬ, G. H., AND PAŠKARJ, S. I.

**The effect of certain growth stimulants in a mixture with nigröl and ash on the healing of wounds in woody plants.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 69: 97-100, bibl. 5, illus.

The experiments described included tests on pear, apple and plum, the results obtained indicated that (1)  $\beta$ -indoleacetic acid in suitable concentration stimulates the healing process, (2) nigröl oil paste in various combinations with ash, 2,4-D and  $\alpha$ -naphthaleneacetic acid appears to be an effective means for general use in hastening healing in fruit and other trees and (3) the success of wound healing is found to be closely dependent on the time of application, and the species and age of the tree.

564. PLESECKIĬ, P. F., AND ZELENSKIĬ, M. A.

**Selecting dwarfing rootstocks for pears and apples.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, No. 10, pp. 18-20.

Since the available dwarfing rootstocks for pears (quince rootstocks) and apples were not hardy enough for the colder fruitgrowing regions of Russia, more resistant dwarfing varieties were raised as seedlings and propagated vegetatively by layering. By selecting and propagating from those shoots which rooted readily, hardy good-rooting strains were obtained.

565. ANON.

**East Malling XII apple stocks; 20,000 imported by Federation.**

*Orchard. N.Z.*, 1949, 22: 9: 2-3, illus.

The clay soil of Nelson, Auckland and Loburn districts

makes East Malling XII the most sought after rootstock for apples in New Zealand. The New Zealand Fruitgrowers' Federation, realizing the difficulties attending the transportation of stocks from the northern to the southern hemisphere, made special arrangements to ship stocks from England in a cool chamber thermostatically controlled between 35° and 40° F. When the plants were unloaded at Wellington after a voyage of 46 days from Liverpool, it was found that there was almost complete lack of break by the buds. The trees were packed for shipment from England in bundles of 500 with sphagnum moss round the roots.

566. PALMER, R. C.

**Dwarf apple trees.**

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 11-14.

Several Malling rootstocks have been under trial on a small scale at Summerland, British Columbia, since 1933. Twelve-year-old trees of several varieties budded on Malling IX have reached a height of about 7 feet and a spread of 11 feet; the dwarfing effect and early bearing have been pronounced, but owing to the brittle nature of the stock it has been found necessary to support each tree to prevent breakage. Fifteen-year-old trees of McIntosh and Red Delicious on Malling II are slightly smaller than trees on open pollinated seedling stocks of Beautiful Arcade, Yellow Transparent and Melba, but with height of 18 feet and girth of 21 feet cannot be regarded as dwarf; cropping started a year or two earlier, but was not heavy, and at 10 years the trees on seedling roots were yielding as much or more. The behaviour of McIntosh on Malling I both as to size and cropping has been very similar to that of trees on seedlings of Beautiful Arcade. Fifteen-year-old McIntosh on XII have made very large trees for their age, cropping relatively lightly for their size and producing large, poorly coloured fruit of poor keeping quality. Trees of both varieties on Malling XVI have made slightly larger trees with slightly heavier cropping than the seedling stocks. The numbers of trees used have been too small to indicate the effect of rootstock upon uniformity of performance; both seedlings and vegetative stocks produced reasonably uniform trees. No winter injury has occurred. Inoculation tests indicate that Malling II, VII and IX are only slightly susceptible to the crown rot organism, *Phytophthora cactorum*, XII and XVI rather more susceptible and I more susceptible still.

567. MANN, A. J.

**Hardy framework stocks for apple trees.**

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 183-6.

Following serious losses from winter injury in a number of years, trials were started in 1936 at Summerland, B.C., based on double working with hardy intermediates. The budded framework stocks were grown for several years in the orchard to develop a branch system before being topworked with the desired commercial varieties. Some 29 varieties including crab apples were used as intermediates, and up to the present some 10,000 trees have been distributed to growers. A block was also established at the Summerland Station itself, the rootstock being Malling XVI,



and the behaviour of 5 varieties on 9 intermediates in the block is described briefly. No severe winter has occurred yet to test hardiness, but growth and yield performances may be summarized as follows: Excellent double-worked trees of Delicious, Winesap, Stayman, Newtown and Jonathan have developed on such intermediates as Hiberna, Charlamoff and Antonovka. At 10 years of age they compare favourably in size and productivity with trees grown on their own frameworks, and in many cases the frameworks obtained are stronger than those of single-worked trees. Virginia Crab has, however, given disappointing results as a framework stock, especially with Winesap and Stayman; though the trees have borne well in the early years there is evidence of a dwarfing effect and a tendency to make poor unions.

568. HILKENBÄUMER, F., AND KOVAČEVIĆ, I.  
Zur methodik des Feldversuchs mit Obst-  
gehölzen. (Methods of field trials with  
fruit trees.)  
*Z. Pflanzenzücht.*, 1949, 28: 186-209, bibl. 24.

The results obtained during the first eight years of three apple rootstock trials conducted by Halle University have been examined to throw light on the number of trees and the records required in field trials. The authors conclude: (i) that at least 9 trees of each treatment (or stock-scion combination) should survive to the end of the experiment. As appreciable losses are expected under German conditions, it is recommended that 12-15 trees should be planted for each treatment; (ii) that trunk girth and tree height and spread are sufficient measures of vegetative capacity. Extension growth records can be discontinued; (iii) that fruit bud or blossom records are of little value in assessing "generative capacity". As the trees were still young a definite conclusion could not be drawn whether it is necessary to record both number and weight of fruit. [The authors would not appear wholly to appreciate the niceties of modern statistical method. Whether their conclusions are correct or incorrect, the reasons given for those conclusions are not entirely convincing.]  
J.T.

### Pollination.

(See also 535f.)

569. PHILP, G. L., AND VANSSELL, G. H.  
Pollination of deciduous fruits by bees.  
*Circ. Calif. agric. Ext. Serv.* 62, revised 1944,  
pp. 26, illus. [received 1950].

The results of pollination studies made at the California Agricultural Experiment Station are summarized, mainly in the form of tables of blossoming dates and varietal compatibilities of almonds, apples, cherries, pears, plums and prunes under Californian conditions. A few additions and alterations have been made since the first, 1932, edition [*H.A.*, 2: 220]. The summary, presenting the fruit growers' pollination problems, is followed by miscellaneous information on the honey bee as a distributor of pollen. The foraging habits of bees, the number of colonies required for adequate pollination of an orchard, and the renting, transport and placing of hives are discussed.

570. STADHOUDERS, P. J.  
De overdracht van het stuifmeel bij de kruisbestuiving van vruchtbomen. (The transfer of pollen in cross pollination of fruit trees.) [English summary 1 p.]  
*Meded. Dir. Tuinb.*, 1949, 12: 830, bibl. 7.

Observations on the cross pollination of fruit trees by wind and by honey-bees are described. The wind appears to effect little transference of pollen. The pollen carried by homing and out-going bees was examined. Out-going bees effected the pollination of a self-sterile variety of cherry, the flowers of which had been previously isolated by gauze-caging. Homing bees mainly carry pollen of one species only; out-going bees carry mixed pollen; and it is therefore concluded that it is possible to effect cross pollination in fruit plantations even if the different varieties have been planted out in blocks. The probabilities of cross pollination, however, decline therewith.

571. MEWISSEN, F.  
Le problème de la pollinisation et de la fécondation des arbres fruitiers. (Pollinating and fertilizing fruit trees.)  
*Fruit belge*, 1950, 18: 17-22.

A discussion on direct and indirect pollination, and on autofertility and autosterility. Early, midseason, and late varieties of apple, pear, cherry and plum are mentioned, and tables are given showing the varieties that may or may not be used for interpollination.

### Growth.

572. SMITH, W. H.  
Cell-multiplication and cell-enlargement in the development of the flesh of the apple fruit.  
*Ann. Bot. Lond.*, 1950, 14: 23-38, bibl. 7.

An analysis was made of cell-multiplication and cell-enlargement in the development of the fruit flesh of 9 varieties of apple, varying both in characteristic fruit-size and season. The period from the commencement of fruit-bud development in the spring to full maturity was covered. During the period preceding pollination, in the development of the tissues which form the basis for the future flesh of the fruit, the cells to some extent enlarged, but the main increase in bulk of tissue was due to multiplication of cells. Development ceased abruptly with the opening of the flower. Following pollination, the rate of increase in amount of flesh and in size of cell rose steadily during the early phase of development. Cell-multiplication virtually ceased to have significance for the development of the flesh by the end of June, by which time a more or less steady rate of increase in weight was associated with a similar course of cell-enlargement. The characteristic varietal size is shown to be determined primarily by the degree of cell-multiplication occurring after pollination. Varietal size was not foreshadowed in the constitution of the flower. Varietal shape was to some extent foreshadowed in the dimensions of those parts of the flower from which the fruit develops. Seasonal variation in mean fruit-size within a given set of trees of the same variety was associated with variation in both size and number of cells in the flesh. Either or both of the factors might be determinative for fruit-size in any one particular season. The Bramley's



Seedling apple, the only triploid variety studied, was found to occupy an anomalous position in this group of varieties. In the pre-pollination stages the cells were both larger and more numerous and the volume of tissue was greater than that in other varieties. After pollination there was less cell-multiplication and more enlargement when comparison was made with other varieties. The work described above was carried out as part of the programme of the Food Investigation Organization of the Department of Scientific and Industrial Research. [From author's summary.]—Ditton Laboratory, East Malling.

573. HOLWILL, P. J. A.  
Occurrence of medullary bundles in the apple shoot.

*Nature*, 1950, **165**: 156-7, bibl. 3.

Investigations are in progress at Wye College to determine the development and function of medullary bundles in the shoots of Worcester Pearmain apple variety worked on E.M. II stock. They are found to occur in Worcester Pearmain when worked on IX but not when worked on XVI stock.

574. ANAGNOSTOPOULOS, P. T.  
L'irrégularité de la production des oliviers en Grèce. (Variable production of olive trees in Greece.)

*Oléiculture et Oléotechnie. Rapports et travaux du XII<sup>e</sup> Congrès Internat. d'Oléiculture*, 1949, pp. 94-7, abstract in *Oléagineux*, 1950, **5**: 145.

The production per olive tree in Greece varies from 1.5 to 100 kg. of oil a year. This variation is due to irregular cultural practices, and can be corrected by applications of nitrogen, irrigation, cultivation of the soil, pruning, and choice of good varieties.

575. MARINUCCI, M.  
L'olivo nelle più recenti acquisizioni sulla sua biologia e coltivazione. (New light on the biology and cultivation of the olive.)

*Ital. agric.*, 1949, **86**: 571-87, bibl. '35.

A useful survey is made of recent work, mainly Italian, on the anatomy of the olive tree and its cultivation: root growth including that of ovoli\*, floral biology, varieties and genetics, rootstock-scion relations, hormone effects, biennial bearing habit, together with recent observations on soil requirements, grafting, nutrition and manuring, pruning, and pruning combined with manuring. [The paper was given before the National Olive Growers' Congress at Bari in September, 1949.]

576. JACOBONI, N.  
Le "gemme di sostituzione" e il potere di autoregolazione dell'olivo. (Replacement buds and the self regulatory power of the olive.)

*Ital. agric.*, 1949, **86**: 591-8, bibl. 31.

The author has observed the course of events in an olive tree when buds fall for various reasons of cold or nutrition and are replaced by subsidiary buds which later function quite normally. From his observations at Perugia in Northern Italy he shows how the olive adapts itself to environmental factors and their effects.

577. BOLLI, M.  
Ovoli artificiali nei rami di olivo. (Artificial ovoli\* on olive branches.)

*Ital. agric.*, 1950, **87**: 42-5.

By tightly binding olive branches the author succeeded in inducing the formation above the ligature of swellings, the composition of which had much in common with that of ovoli as commonly found. He is now proceeding to test whether it is possible to root these swellings. If so, a new method of olive propagation would suggest itself.

### Manuring and soil management.

(See also 496.)

578. FRITZSCHE, R.  
Die Düngung der Obstbäume. (Manuring fruit trees.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, **59**: 93-9.

Discusses the manurial requirements of fruit trees and the technique of supplying the fertilizers to grass orchards, especially by soil injection.

579. BATJER, L. P.  
Reducing cost of orchard fertilization.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 247-9.

Analyses are tabulated for N, P, K, Ca and Mg in the leaves, fruit, bark, wood, shoots and roots of apple trees in the Wenatchee area that had received nitrogen only during the previous 10 years and that had received nitrogen in a compound NPK fertilizer. The "N only" trees contained as much P and K as NPK trees, both P and K being approximately double the critical levels for deficiency symptoms. The expenditure incurred on P and K was thus wasted in this instance, and it seems evident that both P and K were fixed in the upper soil layers. Had this not been the case, as might happen in another soil, the effects could be harmful, P tending to depress the intake of N, and K that of Mg and Ca.

580. SIMON, G.  
La fumure des arbres fruitiers. L'application des engrais au pal injecteur. (Manuring fruit trees. Applying fertilizers with an injection lance.)

*Fruit belge*, 1947, **15**: 1-31, illus. [received 1950].

The manuring of fruit trees is discussed under (1) general considerations, (2) the requirements of the tree during growth, (3) the nutritional reserves of the soil, (4) the organic and mineral fertilizers applied by the grower, (5) the application of manures to the soil, (6) methods of applying manures, (7) applying fertilizers with an injector lance, (8) concentration of the solutions, (9) practical calculations. Two types of injector lance are described and illustrated.

581. BRYNER, W.  
Erfolgreiche Obstbaumdüngung im Betrieb der Eidg. Versuchsanstalt für Obst- und Gartenbau in Wädenswil. (Successful manuring of fruit trees at the Wädenswil horticultural research station.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, **59**: 99-101.

\* Overgrowths, see H.A., 10: 652.

\* See H.A., 10: 652.



An extract from 18 years' records shows the effect of manuring on the yield of apple, pear and stone fruit trees.

582. CASTORINA, L.

Effets physiologiques de la fumure azotée de l'olivier. (Physiological effects of nitrogen manuring on the olive tree.)

*Oléiculture et Oléotechnie, Rapports et travaux du XII<sup>e</sup> Congrès Internat. d'Oléiculture*, 1949, pp. 97-105, abstract in *Oléagineux*, 1950, 5: 145.

Applications of nitrogen increase the concentration of sap in olive trees and, as a result, improve the set of fruit and the total yield. Results of systematic trials have established that, in Italy, the optimum dose of nitrogen is 4 kg.  $\text{NaNO}_3$  per tree.

583. MONIN, A.

Les besoins en humus des arbres fruitiers et le travail du sol dans les vergers. (Humus requirements of fruit trees and cultivation in orchards.)

*Fruit belge*, 1950, 18: 1-7.

A discussion on mulching and green manuring, with figures showing NPK content of crops used for green manuring.

584. GOUDIE, A. G.

Cultivation in Victorian orchards and vineyards.

*J. Dep. Agric. Vict.*, 1949, 47: 459-64.

The main advantages of orchard cultivation are: it prepares the ground for irrigation and drainage; in certain circumstances it improves the capacity of the soil for water intake; it controls the growth of weeds. The main disadvantages are: it is costly; it keeps the roots out of the upper layers of soil which are usually the most fertile; it reduces soil fertility. For the present, growers are advised to reduce cultivation to a minimum, consistent with adequate water and nitrogen supply.

585. HAARER, A. E.

Contour ridging and storm drains.

*Fruitgrower*, 1950, 109: 189-90, illus.

Amplifying his two previous articles on the prevention of soil erosion in British orchards [see *H.A.*, 19: 1913 and 2772], the author discusses the principles underlying the construction of contour ridges and storm drains.

586. BOLLE, A. W.

What's under the ground in your orchard cover crop?

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 217-20.

Some 14 grass and leguminous cover crops are described briefly for use in orchards in Washington State to prevent erosion and improve organic matter and soil structure. In general a mixed cover of grasses and legumes is desirable, and among grasses those producing substantial root systems and light top growth are to be preferred. Power of regeneration after tillage is also desirable in some cases. Legume seed should be inoculated with nitrogen-fixing bacteria.

587. WHEETING, L. C.

Fundamentals of orchard soil management.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 207-12.

A popular article in which soil organic matter, fertilizers, irrigation and soil erosion are discussed with particular reference to Washington State.

588. BENSON, N. R.

The significance of acidity in orchard soil management.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 221-3.

A popular discussion. Among points noted is injury to bark of apple trees in the Wenatchee area through excessive soil acidity.

*Irrigation.*

589. BROWN, J. B., AND MARR, J. C.

The contour-check method of orchard irrigation.

*Circ. Calif. agric. Ext. Serv.* 73, revised 1949, pp. 16, illus.

The contour check method is a simple and inexpensive means of irrigation, particularly suitable for orchards that were not designed for irrigation at planting time and where little or no levelling has been done. Soil ridges are built along the contours of the land and intersected by cross levees to form basins. Construction is temporary, so does not interfere with cultivations or harvesting. The system is not applicable where the slope of the land is greater than  $2\frac{1}{2}$  in 100, or where the flow of water available is less than 300 gal. per minute. This circular gives specific directions concerning the use and layout of the system.

590. SKEPPER, A. H., AND DAVISON, J. R.

Orchard furrow irrigation: problems of faulty irrigation design.

*Agric. Gaz. N.S.W.*, 1949, 60: 584-90, illus.

In the early days of irrigation settlement in Australia many mistakes were made in layout, and method and amount of water supplied in some districts, particularly in areas under horticultural crops. Faulty design is discussed under slope, length of row, and soil type. One of the most important needs is a suitable implement for furrowing-out. Much has been done to adapt standard furrowers for special requirements and some examples of these are illustrated.

591. VEIHMEYER, F. J., AND HENDRICKSON, A. H.

The application of some basic concepts of soil moisture to orchard irrigation.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 25-41, bibl. 16, figs. 11.

A review is given of work done over many years on soil moisture relations in Californian deciduous orchards. Results of this work have already been published. It may, however, be repeated here that two soil moisture conditions, which may be called soil moisture constants, are recognized: the field capacity, representing the maximum amount of water that can be stored in a soil, and the permanent wilting percentage, being the lower limit of readily available water. These are discussed in relation to fruit tree



responses, and it is pointed out that trees can obtain a supply of water with equal facility at all levels between these two constants. Neither fruit size nor quality is affected adversely until soil moisture falls to the permanent wilting percentage, and it is this factor which points the way for efficient use of irrigation water.

592. HENDRICKSON, A. H., AND VEIHMAYER, F. J.  
**Irrigation experiments with olives.**

*Bull. Calif. agric. Exp. Stat.* **715**, 1949, pp. 7.

The results of irrigation experiments with olives, conducted by the University of California during the past 3 years, show that, although the olive tree is drought resistant, the growth of the fruits is considerably affected by lack of readily available soil moisture, particularly in the top 3 feet of soil. It is recommended that olives grown on Hanford sandy loam or similar soils should be irrigated once every 4 weeks during the summer to a depth of 6 feet. Irrigation on shallow soils should be lighter and more frequent. Olives require irrigation earlier in the spring and later in the autumn than deciduous fruits.

### *Training and pruning.*

593. GELJFANDBEIN, P. S.  
**Shaping the crown of prostrate fruit trees.**  
[Russian.]  
*Sad i Ogorod* (Orchard and garden), 1949,  
No. 10, pp. 7-15, bibl. 13, illus.

The different ways of training and pruning prostrate fruit trees in the cold Ural-Siberian region of Russia are discussed in relation to their productivity, with special reference to four forms which are illustrated, viz. (1) plate form: branches are trained horizontally in all directions from the central stem, which is cut back. (2) Minusin form (named after the Minusin region): the trees are planted at an angle of 45°, kept in that position through the summer, and bent down and covered with soil on the approach of winter. (3) The two levels form: with prostrate and vertical branches. (4) The melon-field form: main stem prostrate.

594. WHITE, D. L.  
**Power pruners make speed record in Elberta orchard.**  
*Amer. Fruit Gr.*, 1949, **69**: 12: 9, 27.

The equipment used consisted of power-driven pruning loppers, 4½ feet long; a 17-cubic-foot air compressor mounted on a tractor, with drive from the power take-off; air hoses, 50 feet long; and a tower of adjustable height welded to the trailer. With this outfit each man pruned 40 big peach trees a day instead of 20, and with much less effort, so that the work performed was of a better quality.

595. THOMPSON, C. R.  
**Renewal pruning can be taught in simple words.**  
*Grower*, 1949, **32**: 1130-2, illus.

The author, protagonist of the renewal pruning system, describes how he teaches this method to farm labourers and students. His approach may be of

interest to advisory officers. [For the author's book on the subject see *H.A.*, 19: 1659.]

596. BURMISTROVA, N. D.  
**Rejuvenating peach trees.** [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1949,  
No. 12, pp. 17-19.

Neglected peach trees, with long (6-6.5 m.) branches, bare except towards their tips, producing little new growth (only about 5 cm. long) and a poor unprofitable crop, were given normal cultivation and then cut back hard, namely to 40-60 cm. above the origin of the first branch. The favourable results are described and tabulated for three varieties. In two years the trees were each yielding about 23 kg. of fine fruit.

### *Other cultural problems.*

597. PADFIELD, C. A. S.  
**The effect of a pre-harvest anti-drop hormone spray.**  
*Orchard. N.Z.*, 1949, **22**: 5: 10.

Under New Zealand conditions the application of a pre-harvest spray containing naphthaleneacetamide and naphthaleneacetic acid to Granny Smith apples will cause a deterioration rather than an improvement in their storage quality. This effect is not serious in practice, provided the fruit is stored in oiled wraps. [Author's conclusions.]

598. VERNER, L., AND FRANKLIN, DEL. F.  
**Thinning apples and peaches with blossom sprays.**  
*Proc. 45th ann. Mtg Wash. St. hort. Ass.*,  
1949, pp. 174-82, bibl. 1 in text.

Various methods of fruit thinning have been tried in Idaho since 1943. *Apples*: Good results have been obtained from the use of Elgetol (sodium dinitro-cresylate). Effects obtained in 7 orchards, comprising Rome Beauty, Delicious and Jonathan, are noted. Results compare favourably with hand-thinning, the cost in some cases being as little as one-tenth. Over a 2-year period yields have increased by up to 50% due to the cessation of biennial bearing. Suggestions are made as to concentrations of Elgetol 20 and 30, time to spray in relation to weather conditions and method of spraying. Factors causing poor natural fruit set, which has resulted in occasional over-thinning from spraying, still require investigation. *Peaches*: Use of Elgetol on peaches has shown some promise in two years, but results, particularly as between different varieties, have been too variable to make recommendations possible. Promising results have also been obtained from the use of a stream of water from a power sprayer, although again varietal differences were apparent. Mention is also made of the successful use of the hormone, naphthaleneacetic acid, sprayed on Elberta peaches in Missouri. One positive recommendation can, however, be made at this stage: that is to replace hand-thinning by pole-thinning. A loop of V-shaped fan belting is attached to the end of a pole, and this is used to strike clusters or individual fruits or to remove single peaches by catching them in the loop and jerking them off. In a test plot of J. H. Hale pole-thinning proved as effective as hand-thinning and took half the time.

*Post-harvest work.*

599. FIORITO, G.

Annurche e Sergenti nei melai della Campania. (Ripening and storing Annurca and Sergente apples in Southern Italy.)

*Ital. agric.*, 1950, 87: 33-41.

An account is given of the treatment given to the fruit of two popular apple varieties in the province of Naples. The apples, the picking of which starts not earlier than the beginning of October, after careful sorting, are put in a double layer in the open with the palest surface upwards and are watered from time to time, being picked over and turned to expose the palest portions to the sun every 8 days. This goes on till the middle of December, when the apples are heaped in about 10 layers with wooden supports and covered with straw, etc. Other methods of protection from frost can also be used. The stores are inspected at intervals of a fortnight in the first instance, but later of a week, and spoiled apples are removed. In general it may be said that 15% will be sold in October, 20% in November, 20% in December, 35% in January to March and the rest in April. This compares favourably and economically with possible results of cold storage.

600. MURSELL, P.

Birnam wood to Dunsinane.

*Grower*, 1950, 33: 212-15, 264-5, 317-18, illus.

Some very practical hints on the transplanting of mature trees may be gathered from this series of articles describing the lifting, transport and planting of 14-year-old apples. There was less damage to the roots when trees were lifted with a vertical pull by a crane than when they were pulled up by a tractor, and padded

chains fastened to the lowest branches resulted in least rinding of the bark. After planting, the trees were banked up to a height of 3 or 4 feet, thus making staking unnecessary. Operational costs are analysed.

*Noted.*

601.

a DE PAOLIS, D.

Ciclo di accrescimento e differenziazione delle gemme in piante perenni nel territorio di Bari. III. L'evoluzione della cerchia legnosa in *Prunus amygdalus* Stokes dal Dicembre 1946 al Dicembre 1947. (Growth cycles and bud differentiation in perennial plants in the region of Bari. III. The evolution of the woody circle in *Prunus amygdalus* Stokes from December 1946 to December 1947.)

*Nuov. G. bot. ital.*, 1948, 56: 214-34, bibl. 3.

b REDMAN, R. E.

The Red Haven peach.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 255-6.

c ROBERTS, J.

De teelt van appels en peren voor export in de Rio Negro-vallei. (Growing apples and pears for export in the Rio Negro valley [Argentina].)

*Meded. Dir. Tuinb.*, 1949, 12: 920-34.

d STANBERRY, C. O.

The role of organic matter in orchard soil management.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 213-16.

SMALL FRUITS, VINES AND NUTS.

*Small fruits.*

(See also 545, 1184.)

602. TURNER, H. A.

Berry fruits in Northern Tasmania.

*Tasm. J. Agric.*, 1949, 20: 239-43.

Notes on the cultivation of strawberries, black currants and raspberries under Tasmanian conditions.

603. ANON.

New fruit tray for Wisbech growers.

*Fruitgrower*, 1950, 109: 194, illus.

An aluminium-alloy tray container for soft fruit intended for canning or jamming is described. The design is based on the results of 2 years' field research, and the sizes are standardized to conform with the 14-lb. and 21-lb. wooden trays now in use. As the alloy is impervious to fruit juices, moulds and bacterial contamination are eliminated.

604. JOHNSTON, R. E., AND STORRIE, D. L.

Black currants and red currants.

*Adv. Leaflet. Dep. Agric. Scot.* 12 (n.s.), 1949, pp. 11, 7d.

The varieties of black currants recommended for general purposes in Scotland are Boskoop Giant, Mendip Cross, Wellington XXX, Goliath, Seabrook's Black, Baldwin and Daniel's September. Notes are

given on pests and diseases and the recognition and action to be taken with regard to big bud. Legislation controls the sale of blackcurrant material and this is noted. Red currants are recommended only for private gardens, the varieties suggested being Laxton's No. 1, Murie Red, Earliest of Fourlands, Wilson's Long Bunch. The cultivation of both red and black currants is described.

605. LEBICKAJA, K. A.

The effect of manuring and aeration on the root development of black currant. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, No. 10, pp. 15-18.

Data are given to show the development of roots of black currant bushes grown in different mixtures of clay and sand with complete fertilizer and in mixtures of peat and soil. On the results obtained recommendations are made for applying fertilizers; to insure optimum aeration, 20-25% peat should be added to the soil when planting.

606. EVREINOFF, V.-A.

Observations bio-pomologiques sur les groseilliers à grappes. (Bio-pomological observations on currants [*Rubus*].)

*Repr. Rap. gen. Congr. pomol. Fr.*, Bourges 1949, pp. 164-75.



Twenty-two varieties of red currant are put into 7 groups according to their genetic origin. They are then discussed in relation to their vegetative, floral, and fruit characters, and their relative susceptibility to leaf spot (*Gloeosporium ribis*).

607. KUHLMAN, G. W., AND MUMFORD, D. C.  
Cost of producing boysenberries and loganberries for processing in the Willamette Valley, Oregon.  
*Stat. Bull. Ore. agric. Exp. Stat.* **470**, 1949, pp. 39.

In 1944 some 2,500 acres were under boysenberries and 1,250 acres under loganberries in Oregon. The costs are allocated under labour, materials, general, depreciation on equipment, interest on investment. Such relevant factors as yield, size of planting, siting, irrigation, diseases and pests and age are considered. The average yield of boysenberries over an 11-year period, 1936-1946, was 2,949 lb. per acre, the average cost 8.5 cents a lb. Loganberry figures are given for 1947 only, when yields averaged 3,674 lb. per acre and costs 12 cents per lb.

608. DARROW, G. M., DERMEN, H., AND SCOTT, D. H.  
A tetraploid blueberry from a cross of diploid and hexaploid species.  
*J. Hered.*, 1949, **40**: 304-6, bibl. 3, illus.

The hexaploid rabbiteye blueberry, *Vaccinium ashei*, has proved very much better adapted to cultivation in the southern states of America than the tetraploid highbush blueberry, although the fruit is of a poorer quality and ripens later. Hybrids between the two are generally pentaploid and cannot be used for further breeding. *V. tenellum* is a diploid of the rabbiteye group, having the heat and drought resistance characteristic of the group, but being a low-growing, spreading form. In 1945 at Beltsville, Maryland, crosses were made between the diploid and hexaploid rabbiteye species in an attempt to produce a tetraploid hybrid that could be further hybridized with the tetraploid highbush varieties in order to combine the good qualities of the two groups. From these crosses only one hybrid survived; this was tetraploid and is known as Beltsville 17. It is here described in detail. In 1948 it was successfully pollinated with a large-fruited, high-flavoured, early highbush selection. Additional *V. tenellum* × rabbiteye pollinations were also made, from which 415 good seeds have been obtained.

609. JOHNSTON, R. E., AND STORRIE, D. L.  
Gooseberries.  
*Adv. Leaflet. Dep. Agric. Scot.* **13** (n.s.), 1949, pp. 8, 5d.

Notes on cultivation in Scotland precede a discussion of varieties for picking green (8) and for dessert (8). This is followed by a description of 4 common diseases and their control.

610. SPIRINA, V. V.  
Gooseberries in the eastern zone of the Vologda province. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1949, No. 12, pp. 22-4, illus.

An account of gooseberry breeding work at the observation centre in the Vologda province. Six varieties, all more or less winter hardy and resistant

to American gooseberry mildew, *Sphaerotheca [morsuvae]*, are described and illustrated.

611. CADMAN, C. H., AND MCINTYRE, W.  
Raspberry cultivation.  
*Adv. Leaflet. Dep. Agric. Scot.* **14** (n.s.), 1950, pp. 8, 5d.

A small venture in the Blairgowrie district of Perthshire in the 1890s developed so that in 1914 there were 2,554 acres under raspberries in Scotland, in 1939 6,176 and in 1949 6,190. This leaflet gives practical information for the grower. It is reckoned that a raspberry plantation once established should last some 8 to 10 years. While fairly tolerant of soil conditions raspberries cannot stand bad drainage and they prefer slightly acid conditions, a pH of 6 to 6.5 being optimum. Instructions are given on planting and maintenance. The merits and demerits of the following varieties are discussed: Malling Promise, St. Wallfried and Norfolk Giant, Lloyd George with special reference to the new virus-free introductions from New Zealand, Malling Seedling J and Malling Enterprise, also Malling Seedling M, Malling Notable, the American variety Newburgh and the local Clydeside variety Burnett Holm Seedling. A note is given of the Department's voluntary inspection and certification scheme.

612. WATT, J. H.  
Raspberry culture in New Zealand.  
*Bull. N.Z. Dep. Agric.* **258**, 1949, pp. 29, bibl. 4, illus.

In 1948 the acreage under raspberries in New Zealand was 673. Most commercial gardens ranged from 3 to 10 acres, and few were over 15 acres, while only one was over 100 acres. The total production at present is inadequate. Varieties, cultural, harvesting, and packing operations, and diseases and pests are discussed. A spray schedule is given.

613. KUHLMAN, G. W., AND MUMFORD, D. C.  
Cost of producing red raspberries for processing in the Willamette Valley, Oregon.  
*Stat. Bull. Ore. agric. Exp. Stat.* **472**, 1949, pp. 30.

The area under red raspberries in Oregon in 1944 was 2,100. Figures for 1947 show an average yield of 4,705 lb. per acre with an average cost of 12.94 cents per lb. or \$609 per acre. The costs are carefully analysed.

614. LECRENIER, A.  
La classification horticole des fraisières.  
(The horticultural classification of strawberries.)  
*Bull. hort.*, 1949, **4**: 278, 292.

The origin of the cultivated varieties of strawberry, including the ever-bearing forms, is discussed.

615. HABRAN, R.  
Les variétés de fraisières à gros fruits.  
(Large-fruited varieties of strawberry.)  
*Bull. hort.*, 1949, **4**: 289-92, illus.

Thirty-three varieties of large-fruited strawberry are briefly described. They include the most important ones, others rarely seen now but still grown by some amateurs and market gardeners, and a few notable new varieties.



## 616. ZALJADNOVA, A. P.

**Strawberry varieties for the dry zones of the south-east.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, No. 11, pp. 13-16, illus.

The results obtained at the Saratov fruit and berry experiment station, in raising and testing strawberry varieties suitable for that province, are described with notes on cultivation and manuring and on the characters of the varieties under trial. Eight of them are recommended and described.

## 617. SCHÜTZ, F.

**Les hybrides de fraiser en Suisse. (Strawberry hybrids in Switzerland.)**

*Bull. hort.*, 1949, 4: 293-5, illus.

An account of strawberry breeding at Wädenswil Research Station. Four of the new varieties which are being grown commercially are described.

## 618. ROGERS, W. S., AND WILSON, D. J.

**L'amélioration du fraisier en Grande-Bretagne. (Improving the strawberry in Great Britain.)**

*Bull. hort.*, 1949, 4: 279-82, bibl. 8, illus.

With particular reference to the work at the East Malling Research Station, by two members of the staff of that Station.

## 619. DE VILMORIN, R.

**La sélection sanitaire du fraisier. (The selection of healthy strawberry plants.)**

*C.R. Acad. Agric. Fr.*, 1949, 35: 629-31.

The severe losses from virus diseases in France, particularly from yellow-edge and crinkle, are deplored, and measures for remedying this state of the industry are suggested, by having propagation beds far from other strawberry plantations and in regions free from aphids (e.g. mountainous and maritime zones). An inspection and certification scheme, as introduced in England, is advocated.

## 620. ROGERS, W. S.

**A chimera in the cultivated strawberry.**

*Nature*, 1950, 165: 120-1, bibl. 1.

A variant in the M.40 clone of Royal Sovereign strawberry is described in which the petiole hairs are adpressed upward, instead of spreading. Apparently "the variant originally arose as a mutation, in the form of a sectorial or mericlinal chimera, from which normal vegetative propagation by runners has resulted in a population containing three types of plant, some having normal spreading petiole hairs, some adpressed and a few continuing as sectorial or mericlinal plants with both types of petiole hairs." Although no character other than petiole hair pose seems to be affected, it is desirable that the variant should be eliminated from all stocks used for runner propagation. —East Malling Research Station.

## 621. CHAPRON, R.

**La culture des fraisiers remontants. (Growing ever-bearing strawberries.)**

*Bull. hort.*, 1949, 4: 312-14, illus.

The cultural operations for ever-bearing strawberries are described. Recommended varieties are Mme Raymond Poincaré (crops well and is resistant to frost and drought), Sans Rivale (flowers freely from July

until the first frosts), Triomphe, Record, and Saint-Jean. Ever-bearing strawberries have disadvantages for commercial culture but are strongly recommended for gardens, where they can receive the requisite attention.

## 622. DEPARTMENT OF AGRICULTURE, SCOTLAND.

**Strawberry cultivation.**

*Leaflet. Dep. Agric. Scot.* 8 (n.s.), 1949, pp. 7, 4d.

The area under strawberries in Scotland was 2,981. It sank to 815 in 1943 and has since risen again to 1,401. The decrease was mainly due to the spread of red core disease. It has risen with the introduction of resistant varieties and as the result of legislation prohibiting the sale of stocks which fail to satisfy certain standards of health and purity. The most commonly grown varieties are Royal Sovereign, Cambridge Early, John Ruskin, Scarlet Queen, Huxley Giant and Sir Joseph Paxton. Short accounts are given of the new varieties including Auchincruive Climax, L.R.19, the Cambridge seedlings and the Auchincruive seedlings. A note is given of the legislation mentioned above.

## 623. MARESCHAL, G.

**Le forçage du fraisier. (Forcing strawberries.)**

*Bull. hort.*, 1949, 4: 317-19.

For the successful forcing of strawberries the author gives notes on the kind of greenhouse suitable for the purpose, the preparation of the soil and the application of the necessary fertilizers, producing and potting the young plants, protection from frost, timing and adjusting the heating according to the time when the fruit is required, and hand-pollination. The varieties favoured are Roem van Vlaanderen, Louis Vilmorin and Frédéric Burvenich.

## 624. VAN ORSHAEGEN, A.

**La culture du fraisier sous chassis froids. (Growing strawberries in cold frames.)**

*Bull. hort.*, 1949, 4: 315-16, 326.

Notes are given on appropriate manuring, suitable varieties (e.g. Roem van Vlaanderen, Leopold III, Laxton Noble, Deutsch Evern, Madame Lefebvre), cultural operations, time of placing the frames, and hand-pollinating certain varieties. The frames are placed over the plants in winter for cropping in May, and just before flowering for cropping in the second half of May and in June.

## 625. KUHLMAN, G. W., AND MUMFORD, D. C.

**Cost of producing strawberries for processing in the Willamette Valley, Oregon.**

*Stat. Bull. Ore. Agric. Exp. Stat.* 469, 1949, pp. 38.

The bearing acreage under strawberries in Oregon in 1948 was estimated as 15,000. The average yield taken on an area of 1,170 acres, nearly all under the variety Marshall, in 1947 was 3,529 lb. per acre and the cost 15 cents a lb. or \$531.59 per acre.

## 626. BORGMAN, H. H.

**De invloed van een koudbehandeling op de kieming van aardbei "zaad". (The influence of a cold treatment on the germination of strawberry seed.)** [English summary 11 lines.]

*Meded. Dir. Tuinb.*, 1950, 13: 13-15.

Strawberry seed, if tested immediately after the fruit is picked, germinates with great difficulty. An experiment showed, however, that if such seed is kept for 11 days at 1° C. it germinates quickly and regularly, so that seedlings are obtained within a year of sowing the seeds. It thus seems that the strawberry is one of those crops that need a period of low temperature to end the dormancy period.

627. SIRONVAL, C.

Les radicaux diphenoliques en tant que constituants d'hormones réglant la néoformation des racines chez le fraisier des quatre-saisons. (Diphenolic radicals as constituents of the root-inducing hormones in the ever-bearing alpine strawberry.)

*Lejeunia*, 1947, 11: 2: 45-54, bibl. 8, illus., from abstr. *Ann. Gembl.*, 1949, 55: 217.

A study was made of the early stages of development of the ever-bearing strawberry (*Fragaria vesca* var. *semperflorens*). The appearance of adventitious roots at the cotyledonary node is always preceded by a marked reddening of this area. The red pigment contains phenolic products and, especially, substances with orthodiphenolic radicals.

628. VAN DEN MUIJZENBERG, E. W. B.

La lumière en relation avec la culture de fraisier. (Light in relation to strawberry growing.)

*Bull. hort.*, 1949, 4: 279-86, 299, illus.

The effect of light on the growth, the cultivation, and the form of strawberry plants is described. It is explained how the grower can take advantage of the specific reaction of the strawberry to light by applying special illumination in order to produce crops in autumn, early winter (December) or late winter (February).

629. SIRONVAL, C.

Photopériodisme et culture d'hiver du fraisier des quatre-saisons. (Photoperiodism and the winter treatment of ever-bearing strawberries.)

*Bull. hort.*, 1949, 4: 287-8, illus.

The raising of "ever-bearing" strawberries from seed is described. It is emphasized that to obtain vigorous seedlings the seeds should be as fresh as possible and should be sown during a long-day period. The development of the plants depends on day-length. Thus October seedlings subjected to constant 16 hours per day illumination should come into flower in February.

630. DERMINE, E.

La culture du fraisier à gros fruits. (Growing large-fruited strawberries.)

*Bull. hort.*, 1949, 4: 309-11, 326, bibl. 4.

Notes on climate, soil, manures and fertilizers, planting (distances and systems of planting), and other cultural operations (removing flowers and runners).

*Vines.*

(See also 497, 584, 1180.)

631. BROWNE, F. S.

Growing grapes for home use in Eastern Canada.

*Circ. Div. Hort. exp. Fms Serv. Dep. Agric. Canada* 147 [Publ. 664 revised], 1949, pp. 7.

Varieties are recommended for districts with a frost-free period of 150 days, districts in which this period is 120 days and districts where it is only 110 days. Only the black grape *Fredonia* occurs on all lists. The Kniffen system of training is recommended where winter protection is not needed, the oblique arm system where it is. Both are illustrated.

632. RCHILADZE, I. T.

Grape-growing in Kahetija. [Russian.]

*Vinodelie i Vinogradarsvo* (Wine-making and viticulture), 1950, No. 1, pp. 14-17, illus.

An account of the viticulture of the Kakhelian region of the Georgian S.S.R. where grapes are grown almost solely for wine. The vine-growing districts in the valley of the River Alazan are enumerated and their special kinds of wine mentioned. The rootstocks used are predominantly hybrids of *Riparia* × *Rupestis*. If the rootstock nurseries are increased, as is fore-shadowed, other rootstocks, such as hybrids of *Berlandieri* × *Riparia*, will probably be used. The rootstock "mother" nurseries should be laid out in irrigated areas least liable to hail damage.

633. NEGRULJ, A. M.

Raising new varieties of grapevine by Mičurin's methods. [Russian.]

*Vinodelie i Vinogradarsvo* (Wine-making and viticulture), 1950, No. 2, pp. 42-5.

Raising varieties of vine suitable for growing in various regions of Russia is discussed. Varieties suitable as parents in producing hybrids for special purposes, particularly frost-resistant varieties for the more northerly regions, are mentioned, with notes on the use of mentors and on propagation.

634. VELIČKO, L. V.

Grape varieties recommended for southern farms. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, No. 12, pp. 30-9, illus.

Twelve varieties of table grape suitable for growing in the southern regions of U.S.S.R. are described and illustrated.

635. BRANAS, J.

Recherches sur la densité et la disposition des plantations. (Studies on the spacing and layout of vineyards.)

*Progr. agric. vitic.*, 1949, 132: 285-93, 369-78; 1950, 133: 14-18.

A statistical study of the layout of plots (shown in plan) in an experimental vineyard, with reference to the orientation of the rows, the space between the rows, and the distance between plants along the rows.

636. PORTJANKO, V. F.

A method of increasing rooting in cuttings. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 68: 1121-4, bibl. 1, illus.

An account is given of the "kiljčevanie" method of stratifying cuttings, practised in Russia to induce rooting in vine cuttings. In this method the cuttings are placed vertically with their morphologically upper ends on a layer of ice and snow while the morphologically basal ends are covered with a layer of soil.



The method was applied with success to the yellow currant, willow, privet, tamarisk, yellow acacia, and vine (2 varieties). A modification of the method is described in which, before stratification, the morphological lower ends of the cuttings were immersed for 1 to 2 hours in water at a temperature of 35°-40° C. This treatment applied to cuttings of yellow currant, tamarisk, privet, and a vine variety has a further favourable effect on rooting.

637. DE FERRIÈRE, J. F.  
Alimentation comparée de la vigne en 1947-1948. (The available nutrients of the vine in 1947-1948 compared.)  
*C.R. Acad. Agric. Fr.*, 1949, **35**: 672-4.

The NPK nutrition of the vine in the Mediterranean regions varies with the climate. N is associated particularly with the moisture of the upper layers of the soil rich in humus, P with available water (e.g. rain), while K is less available in humid periods.

638. PEYER, E.  
Anfertigung von Wädenswiler Rebenringen. (The manufacture of Wädenswil vine clips.)  
*Schweiz. Z. Obst- u. Weinb.*, 1950, **59**: 25-6.

An improvement is noted in the form of wire clips for tying vines described in an earlier paper (*Ibid.*, 1949, 58: 2-6; *H.A.*, 19: 957). The device has proved a great success with growers.

#### Nuts.

639. REED, C. A.  
Chinese chestnut varieties.  
*Amer. Nurserym.*, 1950, **91**: 2: 7-8, 66-9, illus.

An account of the history and qualities of 15 varieties and hybrids of Chinese chestnut.

640. KUROKAMI, T., EBIHARA, T., AND TAKE-MATSU, T.  
Studies on the development of keeping quality of chestnut fruits by delaying their germination with phytohormone treatments. [Japanese.]

*J. hort. Ass. Japan*, 1947, **16**: 129-36.

It was found that from 2 to 4 g. of a potassium salt of naphthalene acetic acid or methyl ester in an export case of chestnuts delayed germination without damage until the fourth month of the following year. It is concluded that it is possible to preserve the nuts long enough by the treatment for them to be transported over long distances after passing through the Asiatic tropical zone.

641. VANDERWAEREN, R.  
Is de notenteelt voor uitbreiding vatbaar ? (Can walnut culture be extended ?)  
*Fruittteelt*, 1949, **39**: 999-1001, illus.

There is a scarcity in Holland of both nuts and timber of walnut, as importation figures show. The reasons why walnuts are so little grown in Holland are (1) the plant material is not grafted, (2) the trees are neglected and (3) most of the trees (80 to 90%) start to grow out in spring too early so that the flowers are killed by late frosts. The necessity of grafting with recognized good varieties suitable for local conditions is pointed out.

642. VILIKOVA-KANDAUROVA, V. F.  
The growth and development of trees with reference to the application of mineral fertilizers. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1949, **68**: 945-8, bibl. 6.

Data are tabulated to show the effect of NPK fertilizer and of NPK+lime on the vigour of *Juglans* spp., and that of superphosphate and of phosphorite on ash, hazel, acacia, catalpa, apricot and peach. The results indicate that the application of mineral fertilizer to trees promotes the growth of stems in length and thickness and has a positive effect on the foliage development. On walnuts growing on acid podzol soil the best effect was obtained with complete NPK fertilizer plus lime.

643. OZOL, A. M.  
A method of increasing the winter hardiness of the Persian walnut. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1949, No. 10, pp. 26-8, illus.

In the neighbourhood of Moscow the Persian walnut (*Juglans regia*) is injured by frost, but there is some variation in the degree of winter hardiness of seedlings according to the origin of the seed. Plants raised from seed obtained from middle Asia and from the steppes show greater resistance than those from the Black Sea coast and the Northern Caucasus. In order to increase their resistance to winter injury, pruning experiments were carried out. The current year's shoots were cut back to a half or one-third of their length. Trees so treated proved more resistant to frost than unpruned trees. The best time for pruning was found to be the end of July or beginning of August.

#### Noted.

644.  
a JUCKER, H.  
Wie dünge ich meine Reben ? (How to manure vines.)  
*Schweiz. Z. Obst- u. Weinb.*, 1950, **59**: 106-8. A grower describes his method.  
b KUHLMAN, G. W., AND MUMFORD, D. C.  
Cost of producing black raspberries for processing in the Willamette Valley, Oregon.  
*Stat. Bull. Ore. agric. Exp. Stat.* **473**, 1949, pp. 30.

## PLANT PROTECTION OF DECIDUOUS FRUITS.

## General.

(See also 1155, 1172, 1180, 1197.)

645. (MOORE, W. C.)

Plant diseases in the U.K.

*Fruitgrower*, 1949, 108: 1104.

A report of a paper given by W. C. Moore to the United Nations Scientific Conference on the Conservation and Utilization of Resources. The paper deals with the economic importance of plant diseases, methods of estimating their importance, regional and periodic variations in severity of attack, and some recent advances made in disease control.

646. MILLER, P. R., AND NANCE, N. W.

Preliminary estimates of acreages of crop lands in the United States infested with some organisms causing plant diseases.

*Plant Dis. Repr., Suppl.* 185, 1949, pp. 207-52.

Acreages are tabulated for crops infested with *Fusarium*, *Rhizoctonia*, *Sclerotinia sclerotiorum*, *Verticillium*, *Phymatotrichum omnivorum*, *Heterodera marioni*, nematodes other than root-knot, and other organisms.

647. WOOD, J. I., AND MILLER, P. R. (Compilers).

Losses from plant diseases: effects on crop industries and on farm life.

*Plant Dis. Repr., Suppl.* 186, 1949, pp. 254-82.

A compilation of reports of collaborators of the Plant Disease Survey, received from the various States of U.S.A.

648. HUS, P.

Maladies et déprédateurs du fraisier. (Strawberry diseases and pests.)

*Bull. hort.*, 1949, 4: 296-9.

The most important strawberry diseases and pests in the Netherlands are described.

649. BIOLOGISCHE ZENTRALANSTALT BRAUN-SCHWEIG [GERMANY].

Flugblätter biol. Zentralanst. Braunschweig [various], 1949.

Leaflets of horticultural interest have recently been received on the following subjects: The turnip fly (*Pegomya hyoscyami*) and its control; Potato wart disease (*Synchytrium endobioticum* [Schilb.] Perc.); Stem canker of potato (*Rhizoctonia solani* K.); Potato storage; Club root of cabbage; The virus diseases of potato; The control of sparrows; The control of *Moniliopsis aderholdii* and *Pythium debaryanum* in seedlings; The gooseberry sawfly (*Pteronotus* (*Pteronidea*) *ribesii* Scop.); The apple blossom weevil; The apple sucker; Black leg of potato (*Bacterium phytophthorum*); Bacterial ring-rot of potato; Crown gall of fruit trees and its control; Vine moths (*Clysis ambiguella* Hubn. and *Polychrosis botrana* Schiff.); The San José scale and its significance in German fruit growing; Identification of the most important scale insects of orchard

and vineyard; The apple and pear sawfly; Potato blight.

650. FULTON, B. B.

The strawberry weevil, *Anthonomus signatus* Say.

The strawberry spider mite, *Tetranychus atlanticus* McG.

The strawberry rootworm, *Paria canella*.

GARRISS, H. R., AND CLAYTON, C. N.

Scorch and leaf spot of strawberries (*Diplomacarpus earliana* and *Mycosphaerella fragariae*).

*Ext. Circs. N.C. agric. Exp. Stat.*, Nos. 336 (C, D, E, and G) 1949, 3 to 6 pages each.

Short popular accounts (each with a coloured frontispiece) of some strawberry pests and diseases.

## Nutritional disturbances.

(See also 666, 1154.)

651. DE NYS, P. F.

L'acidité du sol est-elle un mal ? (Is soil acidity deleterious ?)

*Courr. hort.*, 1950, 12: 31-2.

A popular account of soil reaction with particular reference to chlorosis in a pear orchard with an acid soil. The deficiencies that might arise on very acid or very alkaline soils are mentioned.

652. CARNE, W. M.

The non-parasitic disorders of apple fruits in Australia.

*Bull. C.S.I.R. Aust.* 238, 1948, pp. 81, bibl. 42, illus.

A classification of 21 categories of non-parasitic disorders of apples is given and the causes discussed. The disorders are illustrated by 56 photographs.

653. SEN, P. K.

Minor elements in fruit trees.

*Indian J. Hort.*, 1944, 2: 34-8, bibl. 3 [received 1949].

A brief general account of symptoms and control measures associated with deficiencies of B, Cu, Mn and Zn in deciduous fruit trees and citrus.

654. LUCHETTI, G.

Su alcuni casi di defogliazione di alberi causata da salsedine naturale del terreno nel Faraese. (Defoliation of trees caused by the natural salt-containing soils of the province of Ferrara.)

*Not. Mal. Piante*, 1949, No. 7, pp. 13-20.

An abnormal defoliation of peach, poplar and lime [*Tilia*] trees on saline soil in Ferrara, north Italy, is described. On the peach a desiccation of the foliage starts at the apex of the leaf and extends along the margins and inwards towards the midrib, and defoliation proceeds along the branches from the base upwards. Analyses showed normal leaves to contain



0.040 to 0.048% NaCl of the dry matter, and affected leaves 0.068 to 0.076%.

655. CATONI, G., AND OTHERS.

Segnalazioni di malattie da borocarenza nel pero e melo in Trentino. (**Boron deficiency in pears and apples in Trentino.**)

*Not. Mal. Piante*, 1949, No. 6, pp. 24-6.

A disorder in apples and pears in the Trentino region of north Italy has been effectively cured by scattering borax on the soil around the trees at the rate of 10 g. per sq. metre. The symptoms of the disorder on apples are discoloured spots on the fruit caused by the development of corky areas. Such spots may not show at the surface but can be seen around the core on cutting the fruit. The leaves remain small, and are thick and brittle, and anthocyanin develops at the tips and margins.

656. BULLOCK, R. M.

**Boron and zinc deficiencies in Washington orchards.**

*Proc. 45th ann. Mtg. Wash. St. hort. Ass.*, 1949, pp. 225-30, figs. 5.

The main nutrient deficiencies in central Washington orchards are nitrogen, zinc and boron. The symptoms of Zn and B deficiencies are fully described for apples with the aid of photographs. B deficiency cork in the fruit may be confused with bitter pit or stippen and the symptoms of these two disorders are also compared. Zn and B deficiencies may occur together, when the symptoms become confusing. With young trees, with no fruit available for analysis of B, not more than  $\frac{1}{2}$  lb. boric acid per tree should be applied and, if a full cure does not result, a Zn spray.

657. JONES, J. O.

**Copper-deficiency disease of pear trees.**

*Nature*, 1950, 165: 192, bibl. 6.

A severe dieback of terminal shoots in vigorously growing young nursery pears was diagnosed as a symptom of copper deficiency. Control was effected by winter pruning to induce new shoot growth and by spraying the trees with a 0.1% copper sulphate solution the following May. Shoot growth in treated trees, by the end of August, measured 3 feet, while untreated trees made slow growth and again developed serious dieback in early August. The copper content of the leaves from untreated trees was less than half that of the treated trees. This is believed to be the first record of copper deficiency in fruit trees in Great Britain.—N.A.A.S., Wye, Kent.

658. COUDERC, V.

L'action néfaste des défoncements et du sulfatage dans la dégénérescence de la vigne. (**The harmful effects of deep cultivation and spraying with copper sulphate on grape vines.**)

*Rev. int. Bot. appl.*, 1949, 29: 533-6.

The author considers that deterioration in vines is due largely to excessively deep ploughing exposing the subsoil and to increased use of copper sulphate sprays which involve repeated compacting of the soil by spraying machines and tractors and, in soils low in organic matter, the accumulation of copper in toxic amount.

659. KING, T. H., TVEIT, M., AND BASKIN, A. D.  
**Sprays to control chlorosis in flax and strawberries grown on alkaline soil in Minnesota.**

Abstr. in *Phytopathology*, 1950, 40: 14-15.

Chlorosis of strawberries was corrected in both greenhouse and field tests with iron-containing sprays. Fermate at 8 lb. per 100 gal. (approximately 900 p.p.m. iron) and iron sulphate at 2,000 and 4,000 p.p.m., were used as sprays.

660. MCGEORGE, W. T.

**Lime-induced chlorosis: relation between active iron and citric and oxalic acids.**

*Soil Sci.*, 1949, 68: 381-90, bibl. 11, illus.

Lime-induced chlorosis of the iron-deficiency type exists in both orchard and field crops in Arizona. In leaves of citrus and deciduous fruits there was marked correlation between active iron, citric acid and oxalic acid; chlorotic leaves contained less active iron, less oxalic acid, and more citric acid than did green leaves. Chlorosis can be controlled successfully with acid soil correctives, if contact can be made with the root system. Injecting the stems of apple and peach with iron citrate increased active iron and oxalic acid, and decreased citric acid.

661. EATON, J. K.

**The cause of black blotch disease of the raspberry.**

*J. hort. Sci.*, 1950, 25: 128-31, bibl. 3.

Black blotch of raspberry hitherto thought to be caused by *Cryptosporium minimum* is shown by work at East Malling to be primarily due to the toxic action of iron compounds distributed by rain from rusty wire on which the canes are trained.

662. ORTON, C. R., AND CULO, G.

**Manganese content of apple trees.**

Abstr. in *Phytopathology*, 1950, 40: 21.

Internal bark necrosis of apples is caused by excessive intake of manganese. Analyses of leaves and bark of individual trees show great variation in Mn absorption from soil of uniform Mn content, and there is marked difference among apple varieties in their ability to absorb Mn as well as their ability to tolerate excessive amounts of Mn. The Mn content of leaves is much higher than that of bark, but shows similar variations between individual trees.

663. THORNBERRY, H. H.

**Manganese toxicity in peaches.**

Abstr. in *Phytopathology*, 1950, 40: 29.

It is concluded that excessive manganese is involved in the internal bark necrosis of peaches.

664. COOMBE, B. G.

**Zinc treatment of Sultana vines.**

*J. Dep. Agric. S. Aust.*, 1949, 53: 59, 61, illus.

Data obtained from experiments on vines with zinc deficiency symptoms show an increase in yield of 90.3% as a result of winter spraying with zinc sulphate at 2 lb. per gallon.

665. CHABANNES, J., TROCME, S., AND BARBIER, G.  
**Observations sur la carence zincique du pommier. (Observations on zinc deficiency in apple trees.)**

*C.R. Acad. Agric. Fr.*, 1949, 35: 624-6.

A rosette disease of apple trees particularly the variety Calville at l'École Nationale d'Horticulture at Versailles, is attributed to zinc deficiency. Spraying affected trees with a zinc sulphate solution increased the zinc content of the leaves.

### *Climatic factors.*

(See also 504, 535e, 567, 593, 643, 1163, 1189.)

666. KESSLER, H.

Die Niederschlagsarmut während der Wachstumsperiode im Zusammenhang mit der Korkkrankheit des Glockenapfels. (The relation between a dry season and internal cork in the apple variety Glockenapfel.) *Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 8-12, 26-31, bibl. 9, illus.

At the end of the 1948-49 storage period many fruits of the important Swiss apple variety Glockenapfel showed browning of the flesh around the core, and in some cases also near the skin. In the first instance this phenomenon was regarded as a storage trouble, but further investigation in the dry summer of 1949 revealed that the dead tissue was already present in the fruits still hanging on the tree. In one case it was found that only 10% of the apples picked from the shady side of the tree were affected, as compared with 80% picked from the sunny side. The similarity of the symptoms to those described as drought spot, corky core or internal cork in New Zealand and the United States suggested that the cause might be boron deficiency. The diagnosis was confirmed by an analysis of healthy and affected apples, which had a metaboric acid content of 22 and 5.3 mg. respectively per 1 kg. of sugar-free dry substance. Drought, though not a direct cause of the trouble, is thought to increase the susceptibility to boron deficiency, as do other adverse factors which reduce the vigour of the tree, such as a low level of nutrition.

667. GESLIN, H., AND HALLAIRE, M.

À propos de la lutte contre les gelées de printemps—observations microclimatiques en Champagne. (Protection against spring frosts—microclimatic observations in Champagne.)

*C.R. Acad. Agric. Fr.*, 1949, 35: 705-8.

Observations on the microclimates of various localities in the province of Champagne, northern France, in relation to the possible control of frost damage in vineyards by the fumes from aeroplanes.

668. LINDNER, R. C.

Why freezing kills plants.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 189-91.

A popular description of the part played by protein chains and their coating of water in the resistance of cells to freezing.

669. BARANOV, E. I.

Preventing frost damage to vines in the steppe zone of the Crimea. [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 2, pp. 20-1.

In addition to the use of smoke in vineyards to protect

them from spring frosts the author advises spring inundation in vineyards at a distance from natural sources of water such as seas, rivers and lakes, late pruning, and delay in attaching the stems to the lower wires until risk of frost has passed. The observations on which these recommendations are based are discussed.

670. BARSKIĬ, JA. S.

Protecting vines from the effect of low temperatures. [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1949, No. 12, pp. 25-6.

In regions of middle Asia where covering vines in winter is generally practised this operation is not always necessary, but the author advises certain precautions such as growing large plants with 100 to 400 buds, selecting frost-resistant varieties and varieties which develop fruiting shoots from replacement buds, ensuring adequate soil moisture, and training the plants as high espaliers. Observations show that the higher the stems are above ground the less are they subject to low temperature injury.

671. OVERLEY, F. L.

1948-49 winter injury to fruit trees in Washington.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 197-201.

From 8 December, 1948, to the end of February, 1949, temperatures at the Fruit Experiment Station, Wenatchee, fell below freezing every night except one; on 35 days the minimum temperature was 5° F. or less and on 16 days below 0° F. A survey of the damage caused shows peaches to be the most tender, with J. H. Hale more susceptible than Elberta; sweet cherries, especially old trees of Bing, Royal Ann and Lambert, were nearly as tender; pears, especially young Bartletts, were killed to the ground in many orchards; apricots were harder, except where heavy fertilizing or late irrigation had been practised; the Santa Rosa plum and Italian prune were damaged in some cases and not others; among apples, Rome Beauty seemed the most susceptible, some trees being killed, other varieties in ascending order of hardiness being Jonathan, Golden Delicious, Winesap and Delicious. Types of injury to roots, crowns, trunks and buds are described briefly. The use of intermediate stocks, such as Hibernial, for producing a hardy trunk and branch system is suggested for areas where trunk and crotch injury has been pronounced. The inducing of early winter maturity by regulating fertilizers, pruning, irrigation, thinning and cover cropping is also desirable.

672. ANTHON, E. W.

The relation of insects to winter injured trees.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 205-6.

Observations after the 1948-49 winter in Washington State suggest that cherry trees that had been heavily infested with San José scale or trees of various sorts repeatedly attacked by wood borers were more subject to death or injury from freezing than trees free of pests. An increase in attacks by the shot-hole borer on injured trees is expected and control measures are suggested.



673. NIKŠIN, K. G.

The effect of winter lime-washing on the frost resistance of the fruit buds of apricot. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, No. 11, pp. 20-2.

In the Krasnodar region of southern Russia apricot fruit buds are often injured in winter when a thaw is followed by cold weather. Such injury can be largely prevented by lime-washing the trees during winter.

674. HOME, J. M.

Shelterwoods or belts.

*Adv. Leaf. Dep. Agric. Scot.* 5 (n.s.), 1949, pp. 8, 5d. post free.

General directions are given on the choice of species according to soil, aspect, exposure, etc. Those considered include: ash on moist but well-drained banks, beech on limestone, sycamore, birch and alder, Sitka and Norway spruces, lodgepole pine and Corsican pine. Maintenance and improvement are discussed.

675. BAKKER, H. C.

Het windscherm en zijn behandeling. (The windbreak and its treatment.)

*Fruiteelt*, 1949, 39: 990-1, illus.

As a windbreak under Dutch conditions the following is recommended: (1) a row of white willows (*Salix alba*) 1·5 m. apart, (2) at 1·5 m. from the willows a row of Italian poplars 1·0 m. apart, (3) interplanting, between the poplars with common alder or evergreen privet, or planting a row of hawthorns at 1 m. from the poplars.

### Virus diseases.

(See also 619.)

676. THUNG, T. H.

Grondbeginselen der plantenvirologie. (The fundamentals of plant virology.)

*Meded. LandbHoogesch. Wageningen*, 1949, 49: 32-156, bibl. 17 pp., illus.

This is a general review of present knowledge of the nature of plant viruses and of their effect on their hosts. It is not a textbook of virus diseases: individual diseases are not dealt with fully, though many are mentioned in the text. After an introduction there are 7 chapters dealing with the following: 1. The virus (the nature of the infective principle, methods of investigation, some results of modern investigations). 2. Virus diseases (general survey, methods employed, infection from the soil, premunity and antagonism, classification). 3. The infective principle in the plant (synthesis, transport, infection). 4. Epidemiology. 5. Inactivation of viruses. 6. Control. 7. A list of viruses mentioned and their host plants. There are 24 text figures and a coloured frontispiece is a striking copy of a "still-life" study (dated 1619) showing tulips with virus disease.

677. KLECZKOWSKI, A.

Interpreting relationships between the concentrations of plant viruses and numbers of local lesions.

*J. gen. Microbiol.*, 1950, 4: 53-69, bibl. 15.

The effect of dilution on numbers of local lesions produced by plant viruses was tested graphically and

statistically for compatibility with contrasting hypotheses. [From author's summary.]

678. BLUMER, S.

Viruskrankheiten im Obstbau. (Virus diseases of fruit trees.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 63-6, illus.

The discussion includes the so-called Pfeffinger cherry disease, the symptoms of which are illustrated.

679. SMOLÁK, J.

Virové choroby a listy. (Virus diseases and leaves.) [English summary 2½ pp.]

Repr. from *Ochr. rost.*, 1949, Vol. 22, 47 pp., bibl. 15, illus.

Abnormal shapes of leaves caused by virus infection are described. Interesting cases of leaf deformation were found in leaves of the raspberry *Rubus idaeus*. Besides mosaics (A) the virus defects of raspberry leaves can be divided into B, deformation; C, leaf reduction; D, destruction without any sharp distinction between the different types. The most frequent deformities are, (1) top leaflet trilobed, (2) nettle-like leaves, (3) leaves shaped like those of lime (*Tilia*), (4) leaf curl, (5) bent spindle, (6) multiplication of leaves. The most striking leaf reduction observed was a simple, almost fan-shaped leaf formed by the growing together of at least three leaflets, somewhat resembling the leaves of *Ginkgo biloba*. The destruction of raspberry leaves on infected plants affects the whole leaf structure, and begins with deep incisions at the margins or perforations often almost symmetrical.

680. BIRAGHI, A.

Nota preliminare su una probabile nuova virosi del pesco. (Preliminary note on a suspected new virus disease of peach.)

*Not. Mal. Piante*, 1949, No. 6, pp. 33-5.

A disorder in peach trees in northern Italy is thought to be of virus origin. The symptoms are (1) a partial yellowing of the leaves, (2) shortened internodes, and (3) death of affected branches.—Stazione di Patologia Vegetale, Rome.

681. REFATTI, E.

Su di una grave malattia dei peri nelle provincie di Trento e Bolzano. (On a serious pear disease in the provinces of Trento and Bolzano.)

Repr. *Ric. sci.*, 1948, 18: 7, pp. 5, from abstr. in *Rev. appl. Mycol.*, 1949, 28: 579.

Pears in the provinces of Trento and Bolzano, Italy, have been affected for about 40 years by a disease the cause of which is unknown. Early varieties are most affected. Most of the diseased trees are 10 to 20 years old. The affected trees lose vigour; they have small leaves which are less green than normal and fruit spurs are numerous. The symptoms become more marked in the second year and the trees die in the fourth year. No specific organism could be isolated, and work is in progress to ascertain whether the condition is of virus or nutritional origin.

682. WEEKS, T. E., AND KIRKPATRICK, H. C.

A qualitative chemical test for some stone fruit virus diseases.

*Phytopathology*, 1949, 39: 1059-60, bibl. 1.

Punched out leaf samples are treated by boiling in 4% sodium hydroxide in small test-tubes for 15 sec., allowing to cool for 30 sec. and shaking vigorously. Pink or red indicates a positive, green a negative, test.—U.S. Dep. Agric.

683. BLODGETT, E. C., AND OTHERS.

Seed source and understocks for stone fruits in relation to virus diseases.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 160-3.

A general account is given of work being undertaken jointly by the Washington Agricultural Experiment Stations and the U.S. Department of Agriculture, designed to provide growers of stone fruits with nursery material free of virus infection. Sources of budwood and of rootstock seed are being examined, tested and registered. In research on virus diseases a new transmissible disease of apricots has been found, another disease is being studied on J. H. Hale peach, and many peach and cherry trees have died when inoculated with the little cherry virus; many other virus-like disorders and oddities are being investigated.

684. MILBRATH, J. A.

The effect of latent viruses on the growth of cherry trees.

Abstr. in *Phytopathology*, 1950, 40: 19.

Shirofugen and Kwanzan flowering cherry have been found to be reliable index plants for all known strains of cherry ring spot and cherry latent viruses.

685. MOORE, J. D., ALBERT, A. R., AND MOORE, J. G.

Control of sour cherry curl leaf.

Abstr. in *Phytopathology*, 1950, 40: 20.

The best recovery from curl leaf in Montmorency cherry trees resulted with and without fertilizer in the mulched plots, but significant response to treatment occurred, even in the absence of mulch, in plots receiving 0-9-27, 0-0-27, or 0-9-27 fertilizer with  $MgSO_4$ .

686. PRENTICE, I. W., AND HARRIS, R. V.

Mosaic disease of the raspberry in Great Britain. III. Further experiments in symptom analysis.

*J. hort. Sci.*, 1950, 25: 122-7, bibl. 8.

Experiments are described aimed at determining the reaction of certain raspberry varieties to infection with mosaic 2 and the health of existing commercial stocks. During these trials a disease distinct from mosaic was identified in cultures of Lloyd George and was provisionally named "curly dwarf". Norfolk Giant was found to be a sensitive indicator of mosaic 2, Malling Seedling B was confirmed as totally infected with mosaic 2. Both it and Malling Landmark were found not to develop diagnostic symptoms of this disease. A new virus was found to be partially infecting a Red Cross stock.

687. KLINKENBERG, C. H.

Les viroses du fraisier. (Strawberry virus diseases.)

*Bull. hort.*, 1949, 4: 300-8, bibl. 37, illus.

Strawberry virus diseases are described under (a) symptoms, (b) the habits of the vector, *Pentatrichopus (Capitophorus) fragaefolii* Ckll., (c) recognition, (d) control.

688. MILLER, J. H., AND THOMPSON, G. E.

Witches' broom of Japanese walnut in Georgia.

*Plant Dis. Repr.*, 1949, 33: 455, bibl. 2, illus.

The symptoms noted of this virus disease [*H.A.*, 17: 662] of the Japanese walnut, *Juglans sieboldiana*, were a proliferation of adventitious branches (brooms) and dwarfed leaves, many branches having the appearance of abortive staminate racemes. One entire tree was covered with brooms.—Univ. of Georgia, Athens, Georgia.

### Bacteria.

689. BARTRAM, R., AND LUCE, W. A.

Pear blight control.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 250-4.

Recommendations by a committee studying fire blight in California and Oregon with special reference to Eastern Washington.

690. MILLER, P. W., BOLLEN, W. B., AND SIMMONS, J. E.

Filbert bacteriosis and its control.

*Tech. Bull. Ore. agric. Exp. Stat.* 16, 1949, pp. 70, bibl. 34, illus.

Filbert bacteriosis, or filbert blight, is the most destructive parasitic disease of the filbert in Oregon, where it is widely distributed. It has caused the loss of many acres of young trees, and in older orchards has reduced the crop substantially. The disease is described and the cultural and physiological characters of the causal organism, *Xanthomonas corylina*, are given. Rainfall is the most important natural agency in its spread. In young orchards, 1 to 4 years old, autumn or winter planting of well-rooted, first quality nursery trees in a deep, well-drained soil, placing protectors round the trunks, using a good disinfecting agent on pruning tools, and spraying with a protectant bactericide greatly reduced tree losses. Of the spray materials tested, home-made bordeaux mixture was found to be the cheapest and most effective.

### Fungi.

691. TORIKATA, H.

Studies on the resistance of the Japanese pear to black-spot disease (*Alternaria kikuchiana* Tanaka). (1) On the varietal resistance of the pear and the toxic substance as a cause of the disease. [Japanese.]

*J. hort. Ass. Japan*, 1947, 16: 181-91, bibl. 18.

The black spot fungus, when cultivated on leaf extracts or fruit juice of resistant and susceptible varieties, shows no appreciable difference in development. It has been established, however, that there is a substance in the fruit juice which has a direct effect on resistance and susceptibility to disease. The toxic substance secreted by the fungus is absorbed by animal charcoal in a slightly alkaline solution, but not by aluminium hydroxide. When heated to 80° C. its toxicity is lost. Its effect is diminished by low temperatures and reduced pressure; it is not volatile.



692. WEIMER, J. L., AND DUNEGAN, J. C.  
**Identity of anthracnose of lupine and peach caused by *Glomerella cingulata*.**  
*Plant Dis. Repr.*, 1949, 33: 416-17, bibl. 3.  
 The results of experiments described show that isolates of *Glomerella cingulata* from lupin and peach were able to attack both hosts.
693. TAYLOR, C. F.  
**Spray timing in the control of apple fruit spot, sooty blotch and flyspeck.**  
 Abstr. in *Phytopathology*, 1950, 40: 27-8.  
 Applications of bordeaux mixture and of Fermate were made at different times of the year on the apple varieties Rome Beauty and Golden Delicious to determine the spray date most critical in control of sooty blotch. With flyspeck the most effective date was 19 July with both materials. Sooty blotch control with bordeaux mixture was best in mid-July in both 1948 and 1949. With Fermate control was poorer, the most effective date being in late May.
694. STAHEL, M.  
**Starkes Auftreten von Baumschwämmen. (A serious incidence of *Armillaria* on fruit trees.)**  
*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 77-80.  
 The serious incidence of *Armillaria* fruit bodies on the stems of apple trees near the soil, observed in certain areas of Switzerland in the summer of 1949, cannot be attributed to waterlogging or similar causes. In a 65-year-old orchard only such trees were affected as had been headed back 5-10 years earlier. It is suggested that the sudden and severe reduction in the size of the top caused part of the root system to decay, thus creating conditions favourable to *Armillaria* infection. In another orchard the disease was confined to trees that had been reworked to Ontario, while all trees reworked to Boskoop at the same time remained healthy. In this case the root system may have been starved by the relatively small leaf area of the weak-growing Ontario. The practical conclusion is that old trees should not be subjected to severe heading back and reworking, especially to non-vigorous varieties. Shoot growth in old trees should be maintained by suitable fruit wood pruning.
695. MASON, C. L.  
**The use of sodium hypochlorite in the control of peach diseases.**  
*Plant Dis. Repr.*, 1949, 33: 319-20, bibl. 1.  
 Favourable results are reported from spraying peach trees in May and June with 1-2 gal. of commercial sodium hypochlorite per 100 gal. water against bacterial spot (*Xanthomonas pruni*) and fruit brown rot (*Sclerotinia fructicola*).—Univ. Ark., Fayetteville.
696. POULOS, P. L.  
**The use of sodium hypochlorite for the control of the brown rot disease of peach in Delaware.**  
*Plant Dis. Repr.*, 1949, 33: 413-15, bibl. 4.  
 Data obtained indicate that sodium hypochlorite (Chlorox) did not control brown rot under Delaware conditions, and that it is not effective as a chemical dip for the control of the brown rot disease of peach in the package.
697. FOSTER, H. H.  
**Peach spray experiments for brown rot control in South Carolina during 1948.**  
*Plant Dis. Repr.*, 1949, 33: 471-8.  
 Eight different sprays were evaluated in 1948 for the control of the brown rot (*Monilinia fructicola*) disease of peaches in the field, in storage, and during shipment. Seven applications of wettable sulphur 6 lb. to 100 gal., after 1 or 3 blossom sprays with liquid lime-sulphur (1 in 100), gave excellent control. Zerlate and Phygon X-L gave good control, but were not superior to wettable sulphur, and Phygon X-L, at the concentration used, induced a dark streaking on most of the fruit, but the discoloration did not extend into the flesh.
698. HEUBERGER, J. W., POULOS, P. L., AND HOOD, J. J.  
**Peach brown rot: Liquid lime sulphur and certain chlorine compounds as post harvest dip treatments for control in the package.**  
 Abstr. in *Phytopathology*, 1950, 40: 12.  
 Of the preparations used, liquid lime-sulphur was the only one to give statistically significant control over the untreated.
699. POULOS, P. L.  
**Peach brown rot: Relative effectiveness of various spray applications for control in the orchard.**  
 Abstr. in *Phytopathology*, 1950, 40: 22.  
 The data obtained indicate that pre-harvest applications afford no control, that summer applications in a complete schedule aid in control, and that bloom applications apparently are the most important control applications.
700. SMOLÁK, J.  
**Černí jablek. (Cladosporiosis or melanosis of apples.)**  
*Ann. Acad. tchecosl. Agric.*, 1948, 21: 1: 48-53, from abstr. in *Rev. appl. Myc.*, 1950, 29: 30.  
*Cladosporium herbarum* is reported as causing considerable losses in certain varieties of apple in Czechoslovakia. The affected fruits bore black, round, or irregular spots, or a diffuse, black film of hyphae and tufts of conidia covering the whole fruit.
701. WILSON, E. E.  
**The protective and eradivative actions of lime sulfur and Puratized in controlling a fungus leaf-spot disease of olive.**  
 Abstr. in *Phytopathology*, 1950, 40: 32.  
 Lime-sulphur, 3-100, and Puratized N5E (phenyl mercury triethanol ammonium lactate), 3/16-100, applied as sprays to olive leaves infected by *Cycloconium oleaginum*, destroyed many of the conidia produced there and repressed further conidial development for at least a month.
702. SPRAGUE, R.  
**Apple powdery mildew spray trials at the tree fruit station in 1949.**  
*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 47-50.  
 The Jonathan and Black Jonathan crops have been severely attacked by apple powdery mildew at the State College of Washington. Trials with numerous

spray and dust materials made in 1949 are not fully reported, but no eradicant spray was found. For the present the use is recommended of 2.5% concentrated lime-sulphur at pink bud and 2% in the calyx spray. Cost permitting, further protection would be provided by a foliage cover spray of 4 lb. wettable sulphur with a second cover spray of Arathane.

703. TER PELKWIJK, A. J.

Waarnemingen over appelschurft op sier-appels te Wijster (Dr.). (Observations on apple scab on crab-apples at Wijster (Dr.).) *Tijdschr. Plziekt.*, 1949, 55: 312-14, bibl. 3.

During the years 1947-49 the susceptibility of 37 species and varieties of crab apple to apple scab were recorded, and the results compared with those of Mulder [H.A., 20: 146].

704. HUS, P.

Schurftbestrijding. (Scab control.) *Fruiteelt*, 1949, 39: 1010-11, illus.

Notes on the use of mercury compounds, sulphur preparations, tetramethylthiuramdisulphide (TMTD), and carbamates (iron and zinc) in the control of apple and pear scab.

705. MULDER, D.

Schurftbestrijding in Nederland en de Verenigde Staten van Noord-Amerika. (Scab control in Holland and the United States.)

*Meded. Dir. Tuinb.*, 1949, 12: 890-2, bibl. 1.

The author considers that, with regard to scab control in Holland, too little attention is given to the factors influencing infection and too much to the time of spore-ejection, and in this connexion calls attention to the work of Sproston in Vermont, U.S.A.

706. MULDER, D.

Schurftbestrijding in theorie en praktijk in Frankrijk. (Scab control in theory and practice in France.)

*Meded. Dir. Tuinb.*, 1949, 12: 892-4.

Notes based on information obtained in May 1948 during a visit to the Centre Nationale de Recherches Agronomiques at Versailles.

707. DARPoux, H., AND VUITTENEZ, A.

Rôle des périthèces des *Venturia pirina* dans la région parisienne. Influence de l'élimination des feuilles mortes par le bêcheage sur l'intensité des premières contaminations et sur l'évolution ultérieure de la tavelure du poirier. (The role of the perithecia of *Venturia pirina* around Paris. The effect of eliminating dead leaves, by digging them in, on the intensity of the primary infections and on the ultimate development of pear scab.)

*C.R. Acad. Agric. Fr.*, 1949, 35: 592-4.

Around Paris the perithecia of *Venturia pirina* develop in great numbers on the dead leaves, and in the spring liberate innumerable ascospores; these cause primary infections which have a marked effect on the further development of scab. In pruned orchards, where scabbed twigs are mostly removed, the conidia play a secondary part to that of the ascospores in the primary infections. Digging the dead leaves into the soil effectively reduces the chances of infection.

708. SIAENS, F.

La lutte contre la tavelure vue par le praticien. (Scab control in practice.)

*Fruit belge*, 1950, 18: 23-6.

Notes on scab control at the Melle horticultural school (East Flanders, Belgium), in relation to the dispersion of ascospores, with a diagram showing the stages of development of certain pear and apple varieties when fungicides were applied.

709. FISCHER, H., AND BIERI, F.

Schorfbekämpfungsversuche 1949. (Trials for the control of apple scab in 1949.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 50-63, illus.

In the [annual] large-scale trials of fungicides carried out by the Wädenswil and Oeschberg research stations, wettable sulphur preparations and 50% copper oxychloride powder were tested for the control of apple scab and plant injury, the latter chemical in combination with applications of lime-sulphur. The wettable sulphurs were tested with and without the addition of copper sprays.

710. GOLDSWORTHY, M. C., DUNEGAN, J. C., AND WILSON, R. A.

Control of apple scab by ground and tree applications of eradicant fungicides.

*Plant Dis. Repr.*, 1949, 33: 312-18, bibl. 7.

Promising results in the control of apple scab were obtained by a ground spray, at the late dormant period, of Elgetol 0.5% 400 gal. per acre, followed by a tree application of Puratized Agricultural Spray (phenyl mercury thiethanol ammonium lactate) at 1 pint of a 5% solution to 100 gal. of spray fluid at the petal-fall stage.—U.S. Dep. Agric., Beltsville, Maryland.

711. HILBORN, M. T., AND LATHROP, F. H.

Organic fungicides in the control of apple scab and European red mite.

*Abstr. in Phytopathology*, 1950, 40: 12.

Two organic compounds have shown promise not only in the control of scab but also in that of European red mites; one was a mixed glyoxalidine preparation and the other Arathane (CR1639 or dinitrocacrylphenyl crotonate).

712. STODDARD, E. M.

Fungicidal synergism between urea and sulphur.

*Abstr. in Phytopathology*, 1950, 40: 27.

A mixture of urea and sulphur was twice as effective against *Sclerotinia* and apple scab conidia as sulphur alone. It is suggested that there is evidence of synergism between urea and sulphur.

713. FIKRY, A.

Pear scab.

*Bull. Minist. Agric., Cairo, tech. sci. Serv.*

*Pl. Path. Sec.* 226, 1949, pp. 9, bibl. 3, illus.

The distribution of pear scab in Egypt, and the symptoms on foliage and fruit are described. Fayoumi is the only variety attacked, Le Compte and other varieties grown being immune. The intensity of the disease on Fayoumi depends on temperature and relative air humidity, thus it was infected in Lower Egypt but not in Upper Egypt. For control, bordeaux mixture



1:14:100+0.25 agrid or soft soap was satisfactory. Applications should start as soon as the disease appears, and be repeated 4 times at 3 weeks' interval. Sulphur compounds tested such as lime-sulphur and amberene failed to control pear scab.

714. FOSTER, H. H., AND OTHERS.

**Pecan scab spray experiments in South Carolina during 1948.**

*Plant Dis. Repr.*, 1949, 33: 466-70.

A summary of spray experiments to ascertain the relative value of certain fungicides in the control of pecan scab (*Cladosporium effusum*) under South Carolina conditions. Bordeaux mixture proved to be effective, and on some plots Copper-A, Zerlate, and Parzate gave good control.—Clemson College, S.C.

715. RENOUEF, L. R.

**Verticillium wilt of apricots.**

*Fruit & Prod.*, 1949, 4: 1: 23-4.

Verticillium wilt (*V. dahliae*) has caused serious damage to apricot trees in recent years in the Alexandria district, N.Z. As the obvious source of infection is from tomatoes, apricots should not be planted in ground previously used for growing tomatoes, and tomatoes should not be planted among apricot trees.

716. ISAAC, I.

**A comparative study of pathogenic isolates of *Verticillium*.**

*Trans. Brit. mycol. Soc.*, 1949, 32: 137-57, bibl. 28, illus.

A study of isolates of *Verticillium albo-atrum*, *V. dahliae* and *V. nigrescens* from various sources, and from hosts which include horticultural species.

### *Mite and insect pests.*

(See also 672 and 711.)

717. CHILDS, L., AND OLNEY, V. W.

**A discussion of orchard mite control.**

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 133-41.

Four species of mites found in Oregon are described. Increase following the use of DDT has been noted. For control, spraying with 3% lime-sulphur at pink bud and calyx stages is recommended except in the case of sulphur-shy varieties, for which parathion, tetraethyl, Dimite or Arathane can be used. Further infestation from July onwards may have to be dealt with by two additional applications at intervals not exceeding 10 days.

718. DEAN, F. P., AND NEWCOMER, E. J.

**Further evaluation of acaricides for control of mites, the woolly apple aphid, and the codling moth on apples.**

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 151-3.

Several materials were compared with parathion at Yakima for the control of 3 species of mites. DMC was equally effective, Toxaphene less effective, while Arathane, 88R and D-14 were equally effective against some species of mites but not against others. Parathion at 1 lb. or over per 100 gal. controlled woolly aphid, but was ineffective at  $\frac{1}{2}$  lb.; toxaphene and benzene hexachloride also gave control, but the others had no noticeable effect. With codling moth on Delicious and Winesap apples 15% parathion, even up to 3 lb. was

less effective than 1 or 2 lb. 50% DDT; 40% toxaphene at 2 lb. was also less effective. The search for a single material that will control all three pests must therefore continue.

719. JOHANSEN, C., AND BREAKEY, E. P.

**Insecticides tested against the Willamette mite on red raspberries.**

*J. econ. Ent.*, 1949, 42: 562-3.

Dinitro compounds, tetraethyl pyrophosphate, sulphur, rotenone, lauryl sulphide compounds and parathion were tested for control of the Willamette mite (*Tetranychus willamettei*) on red raspberries in the Puyallup Valley. Of these, tetraethyl pyrophosphate was the most promising material. It gave best results when applied as a dust during the warmest part of the day, and is recommended for control of the late-season build-up of the mite population.—Washington Agricultural Experiment Stations.

720. SCHMIDT, G.

**Nachträge und Berichtigungen zu der Arbeit "Gebräuchliche Namen von Schadinsekten in verschiedenen Ländern". (Addenda and corrections to "Common names of insect pests in different countries".)**

Reprinted from *NachrBl. deutsch. PflSch-Dienst*, 1949, Bd. 3, Hft. 3/4, pp. 2.

The original list appeared in *Ent. Beihefte Berlin-Dahlem*, 1939 and 1940, Vols. 6 and 7.

721. ANTHON, E. W.

**Some stone fruit insects.**

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 81-3.

Life histories, damage caused and control measures tested are described for: (1) Peach tree borer: Properly mixed ethylene dichloride and propylene dichloride gave good control; the latter is preferred but has only been used on trees over 3 years old, and it remains to be determined if younger trees will be injured. (2) Aphids: Best control was obtained from parathion at  $\frac{1}{2}$  to 1 lb. of 25% wettable powder.

722. TIDMAN, D. A.

**The control of ants by benzene hexachloride.**

*Pl. Prot. Overs. Rev.*, 1949, 1: 3: 42-6, bibl. 4.

This article includes notes on the use of BHC against ants attacking plantation crops. In India *Oecophylla smaragdina* Fab. attacking fruit trees was repelled for 14 days by dusting the trees with a 5% BHC dust. A 2% BHC dust, blown into broken leaf nests of this species, was very effective. In experiments against ants attacking tobacco seedbeds in Java, "Agrocide" 3 at 44 lb. per acre (0.28 lb. gamma BHC per acre) gave an excellent kill and did not appear to affect seed germination. Against *Formica sanguinea* Latr. on potato tubers, trials showed that a 5% BHC dust at 50 lb. per acre applied to the base of young plants gave very good control.

723. BORG, A.

**Blodlusinventeringen i Skåne 1945-1948. (The hibernation of woolly aphid in Skåne, Sweden, 1945-48.)**

*Medd. Växtskyddsanst.* 53, 1949, pp. 42, bibl. 20.

Although woolly aphid did not occur in Sweden until 1930, it is now common in Western Skåne, the most important fruit-growing area of the country. In 1945 a decree was issued which made it compulsory for owners of apple trees to report any incidence of the pest and in the same year a so-called "buffer zone", 10 km. wide and 125 km. in length, was established to the east of the infested area. An inspection of all orchards and gardens was carried out in this zone from 1945 to 1948 and only 96 trees in 23 gardens were found to be affected. Control measures are discussed.

724. MÜLLER, F. P.

Die Überwinterung der grünen Pfirsichblattlaus (*Myzodes persicae* Sulz.) als Virgino-genia an Zier- und Gewächshauspflanzen. (The hibernation of the green peach aphid in the virginogenia stage on ornamental and glasshouse plants.)

Reprinted from *NachrBl. dtsh. PflSch-Dienst* [Berlin edition], 1949, Bd. 3, Hft. 3/4 and 5/6, pp. 8, bibl. 12.

It is shown that in Central Germany the green peach aphid overwinters in the virginogenia stage on ornamental plants in the glasshouse. Winter washes directed against the eggs on peach trees are therefore insufficient to protect the potato crop from infestation.

725. HORBER, E.

Maikäferfang mit Quecksilberdampflampen? (The trapping of cockchafer with mercury vapour lamps.)

Reprinted from *Mitt. Schweiz. ent. Ges.*, 1949, 22: 116-24, bibl. 10.

In the trials described the cockchafer were not attracted by the light of the mercury vapour lamps.

726. RUNGS, C., AND SCHAEFER, L.

Un nouvel ennemi du pommier cultivé au Maroc. (A new pest of apple trees in Morocco.)

Repr. from *Rev. Path. vég. Ent. agric. Fr.*, 1948, 27, No. 3, 4 pp., illus.

A pest of apple trees in Morocco is described under the name *Agrilus malicola* Rungs and Schaefer nov. sp. A brief account is given of the biology of, and the damage caused by, this Buprestid beetle.

727. DICKER, G. H. L.

Further experiments on the control of the apple blossom weevil, *Anthonomus pomorum* L.

*J. hort. Sci.*, 1950, 25: 111-21, bibl. 2.

In trials at East Malling in the period 1946-48 the application of 5% DDT dust or 0.025% DDT spray at the bud burst stage was more efficacious than that of 5% benzene hexachloride dust. Recommendations are made on the most effective times at which to spray. The persistence of DDT deposit is increased by applying DDT in oil. [From author's summary.]

728. CHRIST, E. G., AND DRIGGERS, B. F.

Strawberry weevil control with new organic insecticides.

*J. econ. Ent.*, 1949, 42: 559.

Tests made by the New Jersey Agricultural Experiment Station indicate that the standard lead arsenate/sulphur

dust and 5% toxaphene dust are only partially successful in controlling strawberry weevil (*Anthonomus signatus*). 1% benzene hexachloride and 5% chlordan dusts, however, reduced injury by 93.5 and 85.5% respectively.

729. CHANDLER, S. C.

Chlordan and benzene hexachloride for control of plum curculio on peach.

*J. econ. Ent.*, 1949, 42: 514-18.

Large-scale tests with various benzene hexachloride and chlordan treatments were conducted in Illinois peach orchards in 1947 and 1948. The most efficient treatments were chlordan used as a spray, 1 lb. actual chlordan per 100 gal.; benzene hexachloride wettable powder, technical grade, 6% gamma at 3 lb. per 100 gal.; and a 1% benzene hexachloride gamma dust, technical grade, all applied 6 or 7 times at 7-10-day intervals. These treatments were from 3 to 10 times as efficient as lead arsenate for control of plum curculio. —State Natural History Survey, Carbondale, Illinois.

730. MOSSOP, M. C.

Fruit flies and melon flies.

*Rhod. agric. J.*, 1949, 46: 421-3, being *Ent. adv. Circ.* 3.

Advice is given on the control of fruit flies (*Pterandrus rosa* and *Ceratitis capitata*) and melon flies (mostly *Dacus* spp.) by efficient destruction of infested fruit and by baiting. Poison baits of sodium fluosilicate or lead arsenate in sugar solutions are recommended.

731. FRICK, K. E.

The present status of the cherry fruit fly in the Yakima valley.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 99-110.

Among various new insecticides tested in 1949, only methoxychlor sprays applied to fruit and foliage and BHC sprays applied to the cover crop showed much promise. For cherries to be processed 2 sprays of lead arsenate at 2 lb. per 100 gal. at a 10-day interval are recommended; for dessert cherries lead arsenate leaves a visible and toxic residue.

732. SCHNEIDER, F., AND VOGEL, W.

Neuere Erfahrungen in der chemischen Bekämpfung der Kirschenfliege (*Rhagoletis cerasi*). (Recent observations on the chemical control of the cherry fruit fly.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 37-47.

The paper, read at a conference of Swiss pomologists in December 1949, surveys the results so far obtained in many years' trials carried out by Wädenswil pathologists and other workers in Switzerland. The dual object of spraying cherry orchards with DDT, viz. to control the pest in the year of treatment and to prevent recurring infestation for a number of years, may be achieved, if the following conditions are fulfilled: (1) No part of the area must be left untreated and it must be more than 1 km. distant from any source of infestation. (2) Early and late varieties must not be mixed in one locality, only early and medium-early ones. (3) Timing and number of applications should be determined by trained personnel. (4) Spraying should be thorough and it should be carried out consistently for 2-3 years running. The result of the



control measures is checked by the so-called salt-water test. Concentrated sodium chloride solution is poured over 100-200 cherries, which have been cut open and placed in jars. After stirring, the larvae come to the surface and their number per 100 cherries is calculated.

733. GHESQUIÈRE, J.

La mouche noire des figes, *Lonchaea aristella* Beck. à la Côte d'Azur (Diptère *Lonchaeidae*). (The fig black fly on the shores of the Mediterranean.)

*C.R. Acad. Agric. Fr.*, 1949, 35: 650-3.

The distribution, characters, and life-cycle of the fig black fly are described. The losses due to it amount sometimes to 50% of the fruit. Control measures discussed are, collecting and burying infested fallen fruit, the use of fly-traps, and the introduction of *Pachyneuron vindemiae* Rond., the only known parasite.

734. MILLER, L. W.

The effects of a D.D.T. schedule on the canary fly (*Typhlocyba froggatti*, Baker).

*Tasm. J. Agric.*, 1949, 20: 246-7, bibl. 2.

The canary fly or apple leafhopper has been a serious pest of apples in Tasmania in certain seasons. It causes a yellowing and premature fall of the leaves, and renders the fruit unsightly with its brownish specks of excrement. A DDT spray schedule, though primarily applied against codling moth, was extremely effective in controlling the leafhoppers.

735. DOUTT, R. L., AND HAGEN, K. S.

Periodic colonization of *Chrysopa californica* as a possible control of mealybugs.

*J. econ. Ent.*, 1949, 42: 560-1, bibl. 2.

Adults of *Chrysopa californica*, a natural predator on a mealybug (*Pseudococcus* sp.) pest of pears, are sensitive to DDT, and oviposition is inhibited by the presence of this insecticide. The larval stage, however, is able to survive field spraying. An attempt was made to control mealybug by artificially colonizing sprayed pear orchards with *Chrysopa* eggs raised in an insectary. Colonizations made during spring and early summer suppressed the mealybug populations, but earlier colonizations were less effective. These field studies indicate that while the technique shows promise as a possible method of mealybug control, further investigations are necessary to determine the proper timing and minimum colonizations required.—Division of Biological Control, University of California.

736. MAY, A. W. S.

Codling moth and light brown apple moth control experiments, 1948-49.

*Qd agric. J.*, 1949, 69: 340-3.

The results indicate that DDT should be applied against larval populations following peaks of moth activity. Cover sprays of 0.1% DDT, three weeks apart, are sufficient to check the late spring codling moth infestation. These sprays will also serve to arrest early summer light brown apple moth damage. Midsummer applications of DDT for codling moth control should be dictated by trapping records. The measures used for mite and woolly aphis control, viz. a dormant or semi-dormant oil spray and an early to mid-summer application of hexaethyl tetraphosphate with a thorough wetting of woolly aphis, appeared

adequate and should be employed on orchards where DDT is used.

737. BOVEY, P.

Le carpocapse des pommes *Enarmonia pomonella* (L.) ravageur des abricots en Valais. (Apple codling moth, *Enarmonia pomonella* (L.) attacking apricots in Valais.

*Publ. Stat. féd. Ess. vitic. arbor. Chim. agric., Montagibéri, Lausanne, Sect. Ent.* 381, 1949, pp. 137-172, being reprinted from *Mitt. schweiz. ent. Ges.*, 1949, Vol. 22, No. 2, bibl. 16, illus.

Since 1930 the codling moth has attacked apricots in plantations on the south-facing slopes of the Rhone valley in Valais. The losses sometimes are 30% to 50% of the crop. In the plain, where apricots are included in dense plantations of apples and pears, the damaged fruit rarely exceeds 1%. Observations recorded include the following. During the last 5 years mature moths have been more numerous in the unmixed plantations of the slopes than in the mixed plantations of the plain. Under Valais conditions, on the variety Luizet, the moth lays its eggs on the leaves, preferably on the lower surface, and on the smooth bark of the previous year's fruit-bearing twigs. The eggs are laid near the fruits, not on their surface. The young caterpillars enter most often (more than 80% of cases) at the point of contact of two apricots. On the slopes where apricots are grown in vineyards some of the caterpillars hibernate on the vine stems. Control can be effected by treating the trees 6-8 days after the first peak flight period either with a DDT emulsion (100 g. active ingredient per 100 litres) or with DDT 50 at 0.2%. One application is sufficient.

738. YOTHERS, M. A.

Oriental fruit moth investigations in the Yakima district in 1949.

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 91-8.

A survey of incidence on peaches and control experiments are reported. From the latter the use is recommended of 25% wettable parathion, 1 lb. per 100 gal. (or 1½ lb. of 15%) or 50% wettable DDT, 2 lb. per 100 gal. Apply after petal fall and again 10-12 days later, and a third time if necessary. Determinations of spray residues on the fruit showed these to be negligible.

739. MORRIS, D. S.

Oriental peach moth spraying trials in the Goulburn Valley. Progress report.

*J. Dep. Agric. Vict.*, 1949, 47: 442.

The trials indicate that both DDT and E.605 (diethyl para nitrophenyl thiophosphate) are promising for the control of the oriental peach moth (*Laspeyresia molesta*).

740. JANNONE, G.

La *Malacosoma neustria* L. o "campa" del mandorlo. (*M. neustria*, a pest of almond.)

*Agric. pugliese, Bari*, 1947, 1: 3: 33-8, illus., from abstr. in *Rev. appl. Ent.*, 1949, 37, Ser. A, p. 445.

*Malacosoma neustria* [lackey moth] is a troublesome pest of almond, in the province of Bari, Italy. Its life cycle is described. The eggs are parasitized by the Scelionid, *Telenomus terebrans* Mayr, which has two

generations a year. Control measures recommended are the removal of shoots bearing eggs during winter, and spraying with 0.5% lead arsenate with an adhesive against the larvae in March-April. Another pest of almond in the district is the Tingid, *Monosteira uncostata*, Muls. & Rey, which feeds on the buds and leaves causing the latter to fall in August-September. It is spreading to fresh areas every year.

741. COX, J. A.

Field experiments for control of grape berry moth.

*J. econ. Ent.*, 1949, 42: 507-14, bibl. 6.

Results are given of tests carried out during the period 1944-48 to compare the effectiveness of some of the newer insecticides with the standard lead arsenate and nicotine sprays for control of grape berry borer (*Polychrosis viteana*). Three applications of DDT at the rate of 0.75 lb. per 100 gal. gave better control than the standard treatment. Once the berry moth population has been reduced to a low level, 2 well-timed sprays will give ample commercial protection. DDD also gave excellent control; parathion was quite effective. No injury to fruit or foliage of Concord grapes was observed with any of these materials. The following materials were not satisfactory: phenothiazine, benzene hexachloride, toxaphene and chlordane.

742. MÜLLER, F. P.

Stärke und Dichte der Besiedlung durch die Blattgallenreblaus auf der Europäerrebe bei Freilandversuchen. (Incidence of phylloxera leaf galls in European vines as observed in field trials.)

Reprinted from *Weinbau, wiss. Beihefte*, Sept./Oct. 1949, pp. 276-86, bibl. 25.

In field trials carried out at Naumburg, Germany, it was shown that the foliage of European vines is not resistant to infestation with phylloxera and that leaf galls are readily formed.

743. MCKINLAY, K. S.

Mode of action of insecticides used for the control of apple sawfly, *Hoplocampa testudinea*, Klug.

*Nature*, 1950, 165: 326-7, bibl. 1.

Trials with nicotine and parathion, in the course of which stung apple blossoms were examined daily during the hatching period, showed that neither of the two insecticides acted as an ovicide in the case of *Hoplocampa testudinea*. As the use of nicotine makes timing very close to peak hatch necessary, the application of an insecticide with greater residual action would be preferable. Work on this type of control continues. —East Malling Research Station.

744. ROBERTI, D.

Le oplocampe del susino. I. *Hoplocampa flava* (L.). (*Hoplocampa* spp. on plum. I. *H. flava*.)

*Boll. Lab. Ent. agr. Portici*, 1947, 7: 41-92, illus., from abstr. in *Rev. appl. Ent.*, 1950, 33: 43.

All stages of the plum sawfly are described, and an account is given of observations on its bionomics and control on plum to the south of Naples, where it is the predominant species of its genus on that crop and

causes 50-100% loss in some years. Many varieties of plums and *Prunus insititia* were attacked, as also were apricots growing near heavily infected plums in 1946, but *P. avium* was not, and the various varieties of cherry plum (*P. cerasifera*) flower too early to be infested. Some control is afforded by jarring the adults from the trees in the early morning, destroying infested fruitlets, and spraying with lead arsenate, nicotine sulphate, quassia or DDT. Two applications, the first when three-quarters of the petals had fallen and the second 10 days later, were more effective than the first only.

745. ROMANEVIČ, B. V.

The control of the banded scale insect. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, No. 12, pp. 25-8, illus.

The banded scale, *Sphaerolecanium unifasciatum* Arch., causes much damage to peach and almond trees in central Asia, the females infesting young shoots and twigs. The larvae hibernating on the damaged twigs can survive temperatures of  $-20^{\circ}$  to  $-30^{\circ}$  C. The most vulnerable stages in the life cycle are, the larvae on emerging from hibernation, and the mature females; they are then most sensitive to contact insecticides. Application may also be successfully made as the larvae emerge from the eggs and begin to migrate. Trials at the Samarkand fruit breeding station show that good control can be obtained with 5% dichloroethane oil emulsion and DDT preparations.

746. KIRIUKHIN, G.

*Syngenaspis oleae* Colvée, cochenille nuisible aux arbres fruitiers et ses parasites. (*Syngenaspis oleae* Colvée, a scale insect infesting fruit trees, and its parasites.) [Iranian. French summary 2 pp.]

*Ent. Phytopath. appl.*, 1948, Nos. 6 & 7, pp. 69-76 [received 1950].

The chief fruit trees and ornamental plants attacked by this scale insect are listed, and its morphological characters and biology described. It has many predators and parasites; the distribution in Iran of those already found there is given and one of the parasites, *Aphytis proclia* Wlk., is described. Recommendations for the control of the scale are spraying with DDT emulsion at the end of winter and early in spring, and with 1% Gesarol when the larvae hatch out.

#### Other pests.

(See also 819.)

747. STORER, T. I.

Control of field rodents in California.

*Circ. Calif. agric. Ext. Serv.* 138, 1949, pp. 50, bibl. 27, illus.

The animals discussed are ground squirrels, tree squirrels, pocket gophers, moles, meadow mice, kangaroo rats, muskrats, and rabbits. Control measures mentioned are poison baits and poisonous gases, trapping, shooting, exclusion, and encouragement of natural enemies. The author gives instructions for applying these measures, and formulae for the poisons recommended.



748. BARNES, H. F.

The control of slugs on allotments and gardens.

Reprinted from *Northern Allotment and Gdn*, May, June and July, 1949, pp. 11.

A popular article in which the author describes how to determine the species of slugs that occur in a garden, and how best to control them, in the light of his recent investigations on the habits of the various species.

### *Sprays and spray effects.*

(See also 499.)

749. HALLEMANS, A.

A propos de la combinaison de produits de phytopharmacie en horticulture et agriculture. (The combination of plant protection products in horticulture and agriculture.)

*Courr. hort.*, 1950, 12: 36-8.

An account of combined pest and disease control preparations with examples of advised combinations for special purposes. The compatibility and incompatibility of preparations commonly used in horticultural and agricultural practice are shown diagrammatically.

750. (THE FUNGICIDE COMMITTEE OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY.)

Nation-wide results with fungicides in 1948: fourth annual report.

*Plant Dis. Repr. Suppl.* 181, 1949, pp. 87.

The reports include results with more than 175 different fungicides used on 65 kinds of plants.

751. GREEN, E. L.

Adhesives for fungicide dusts.

*Industr. Engng Chem.*, 1950, 42: 324-30, bibl. 7.

An apparatus for the testing of adhesives for horticultural mist dusting is described, sulphur being the fungicide used. Only a few of the 110 materials examined were found to cause a desirably increased adherence.—Beltsville, Md.

752. STAEHELIN, M.

Influence des traitements sur la physiologie de la plante. (The effect of treatment on the physiology of the plant.)

*Publ. Stat. féd. Ess. vitic. arbor. Chim. agric.*, Montagibert, Lausanne, *Sect. Physiol* 576, 1949, pp. 80, bibl. 24.

The author mentions the deleterious effect on the foliage of plants of fungicides and their consequent effect on the physiological processes. He then reviews the conclusions of various workers on the harmful action of copper and sulphur preparations and gives the following advice to growers: (1) Never exceed the treatment indicated by the manufacturers or official stations, (2) use only products or mixtures approved by the stations, (3) use only fresh preparations, not those which have undergone chemical change, and (4) never apply preparations when the weather is likely to favour physiological disorders.

753. GOLDSWORTHY, M. C., AND GERTLER, S. I.

Fungicidal and phytotoxic properties of 506 synthetic organic compounds.

*Plant Dis. Repr., Suppl.* 182, 1949, pp. 89-109.

The test objects were conidia of the brown rot fungus *Monilinia* [*Sclerotinia*] *fruticola* and the apple bitter rot fungus *Glomerella cingulata*. Of the compounds tested 456 failed to show any fungicidal effect on either organism, but 47 of them were found to be toxic in some degree to the conidia of both fungi.

754. MARTIN, J. T.

Pest control in agriculture.

*A.R. Progr. appl. chem.*, 1947, 32: 335-46, bibl. 139.

The following insecticides are discussed: DDT, benzene hexachloride and other chlorinated compounds; organic phosphorus compounds, among them those with systemic action; azobenzene; plant products and miscellaneous preparations.

755. RIPPER, W. E.

New selective and systemic insecticide.

*Agric. Chemls*, 1950, 5: 29, 84, bibl. 11.

Large-scale trials carried out by Pest Control Ltd. in England and Africa reveal the great possibilities of the new insecticide octa-methyl-pyro-phosphoramidate, the first compound to combine truly selective with systemic action. In the tests it proved effective against 14 species of aphid and 2 species of red spider and in all cases it showed prolonged toxicity of from 2 to 5 weeks after spraying. In contrast to parathion treatment, which often involves a rapid re-infestation, the unharmed predators prevent the build up of a new pest population. Mammalian toxicity of the new chemical is similar to that of parathion, but in crops sprayed up to 6 weeks before harvesting no toxic residue whatsoever was discovered.

756. PAGE, A. B. P.

Insecticides.

*A.R. Progr. appl. Chem.*, 1948, 33: 435-52, bibl. 139.

In this review of recent literature fumigants receive the most detailed treatment (over 6 pages). The other topics selected for discussion are: Systemic and other phosphorus insecticides; vegetable insecticides; pyrethrum synergists; stabilization of insecticides; persistence of insecticides under field conditions; application of insecticides; diluents for toxic dusts; spraying by aircraft; damage to wild life, plants and mammals by DDT, BHC, chlordan, and chlorinated camphene; the mode of action of contact insecticides; resistant strains of insects; chemical control of non-insect pests.

757. KOVAČEVIĆ, Z., AND SCHMIDT, L.

Resultati bioloških pokusa sa katranskim i nekim drugim sredstvima za prskanje voćaka. (The results of biological experiments with tar oil products and other substances used in horticulture.) [French summary 5 pp.]

*Libr. J. sci. tech. agric. Essays*, Belgrade,\* 1949, 1: 2: 3-66, bibl. 31, illus.

\* Published by the Agricultural Institutes F.P.R. of Yugoslavia.

An account of trials with carbolineums, mineral oils, liquid DDT preparations of dinitro-ortho-cresol, and lime-sulphur against San José scale, European fruit scale (*Lecanium corni*), woolly aphid, gipsy moth (*Lymantria dispar*), codling moth, and apple blossom weevil.

758. GERHARDT, F., AND O'NEILL, W. J.  
Storage and ripening of apples and pears as influenced by DDT and parathion sprays.  
*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 51-5.

Preliminary studies indicate that neither the storage life nor dessert qualities of fruits of Red and Common Delicious apples and Anjou pears were impaired by pest spraying programmes in which DDT plus parathion and parathion alone had been used.

759. O'NEILL, W. J.  
Is parathion the answer?  
*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 155-7.

Spraying trials on apples at Wenatchee with 14 materials each used in 3 applications showed parathion to be the most versatile and effective insecticide against apple pests in general. Its high toxicity to man and animals makes it desirable, however, to find a safer compound, and in the meantime its use should be continued with due precaution.

760. NOLAN, K., AND WILCOXON, F.  
Method of bioassay for traces of parathion in plant material.  
*Agric. Chemls*, 1950, 5: 53, 74, bibl. 3.

The plant material used in these experiments were onion bulbs, potato foliage, maize foliage and string beans.

761. BOTTGER, G. T., YERINGTON, A. P., AND GERTLER, S. I.  
Preliminary tests of chlorinated benzamides as insecticides.  
[*Publ.*] U.S. Dep. Agric., *agric. Res. Administ.*, *Bur. Ent. Pl. Quar.* E-789, 1949, pp. 21.

The results are tabulated for tests with 128 chlorinated benzamides, the test insects including horticultural pests.

762. BOTTGER, G. T., YERINGTON, A. P., AND GERTLER, S. I.  
Preliminary tests of synthetic organic compounds as insecticides. Part VI.  
[*Publ.*] U.S. Dep. Agric., *agric. Res. Administ.*, *Bur. Ent. Pl. Quar.* E-790, 1949, pp. 18.

The results are tabulated of tests in which a number of horticultural pests were included as test insects.

763. GOLDSWORTHY, M. C., AND FOSTER, A. C.  
The effect of organic sprays on orchard soils.  
*Amer. Fruit. Gr.*, 1950, 70: 2: 22, 52-3.

The authors, members of the U.S. Department of Agriculture, discuss in a general manner the effect on orchard cover crops and young fruit plantings of DDT, BHC and parathion accumulation in the soil. While the last-named chemical breaks down too quickly to

create a problem, the two other insecticides are very stable. Results obtained in non-specified experiments show that certain cover crops are susceptible to a concentration of DDT in the soil and that BHC, at the rate it is used in peach orchards for plum curculio control, may even sterilize the surface layers. So far damage to trees has not been observed in established orchards, presumably because the chemicals have not yet come into contact with the roots. However, pot trials suggest that young trees planted on the site of old orchards would probably suffer. The preliminary conclusions drawn are: (1) The insecticides should be used sparingly, and (2) resistant cover crops should be chosen.

764. PETERSEN, D., AND CATION, D.  
Spray injury to sour cherry petals during warm weather.  
*Plant Dis. Repr.*, 1949, 33: 479-80.

Severe browning of cherry petals sometimes followed spraying in bloom with liquid lime-sulphur 2 gal. in 100 gal. Tests with other preparations caused similar injury, the browning being most severe when the applications were made during the hours 10 a.m. to 4 p.m. and most noticeable on the north side of the trees. It was found that extremely warm weather at a critical period was the major factor in aggravating the injury to cherry petals by sulphur-containing sprays.—Michigan State College, East Lansing, Mich.

765. BOHART, G. E., AND LIEBERMAN, F. V.  
Effect of an experimental field application of DDT dust on *Nomia melanderi* [species of wild bee].  
*J. econ. Ent.*, 1949, 42: 519-22, bibl. 5.

The application was moderately repellent to the bees for a few hours. More than 2% of the females nesting in sample areas were found dead at their nest entrances after the dusting, and about 15% of the nests in the same areas became inactive, apparently as a result of the treatment. It is concluded that DDT should be used with caution on areas where *Nomia* bees may nest or forage.—Bur. Ent. Pl. Quar. U.S.D.A.

766. HÄFLIGER, E.  
Comparative toxicity of various insecticides to the honeybee.  
*J. econ. Ent.*, 1949, 42: 523-8, bibl. 5.

The toxicity of DDT compounds to bees depends very much upon temperature. In the biological temperature range bees can survive exposure to 10 or 20 times as much of a DDT compound as at the usual laboratory temperature. This explains why bees can be poisoned with very small amounts in the laboratory while not a single case of bee colony poisoning has occurred in agricultural practice. Benzene hexachloride appeared to be about 200 times, and parathion and calcium arsenate as much as 300-500 times as toxic to bees as DDT-suspensions.—Basle, Switzerland.

#### *Spraying apparatus.*

767. TAYLOR, G. G.  
Data on semi-concentrate air-flow spray machines.  
*Orchard. N.Z.*, 1949, 22: 9: 13-16, illus.

A report based on data collected and observations



made in the United States of America during 1948. The advantages and disadvantages of semi-concentrate spraying are set out, and brief descriptions of 7 types of machine are tabulated.

768. MARSHALL, J., AND MCARTHUR, J. M.  
Concentrate orchard sprayers in British Columbia.  
*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 287-94, bibl. 3 in text (being *Contr. 2368, Div. Ent., Sci. Serv. Dep. Agric. Canada*).

Mention is made of several new high-velocity automatic spraying machines operating steam-air and hydraulic-air units. Trials comparing the new concentrated sprayers with hand sprayers are described. Results with dormant sprays are very satisfactory, savings in labour being about 80% and in materials about 50% with good coverage and effective pest control. In view of their high efficiency in depositing toxicants it is surprising that pest control is not higher than that from hand spraying, and this point is being investigated. With summer sprays, however, spray applications have not been so uniform with concentrate sprayers as with thorough hand-spraying.

769. PEYER, E.  
Einfluss von Spritzrohr und Spritzdüsen auf die Leistungen bei der Rebesspritzung.  
(The influence of gun and nozzle on performance in the spraying of vines.)  
*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 66-71, bibl. 1, illus.

Data are tabulated on the performance of spray guns with a single, two and three nozzles. Once the workers have got used to it, the double nozzle will probably be more suitable for vine spraying than either of the two other types.

770. BURRELL, A. B.  
Orchard tests with a large air-blast sprayer modified to apply partial concentrates.  
Abstr. in *Phytopathology*, 1950, 40: 4.

Plots of 17-year-old McIntosh apple trees were sprayed with the usual fungicide-insecticide combinations at 2, 4, and 8 times standard concentrations, the gallonage being reduced proportionately so that the same amount of chemical was directed to each tree. The machine was a 1947 Speedsprayer operating at 60 p.s.i. water pressure, 45,000 cu. ft. of air per minute at 95 m.p.h. when delivering both sides. Control of apple scab and certain insects was satisfactory and similar with all concentrations.

771. MAAN, W. J.  
Iets over nieuwe typen hefschroefvliegtuigen. (Some new types of helicopter.)  
*Meded. Dir. Tuinb.*, 1949, 12: 868-75.

Mention is made of the use of aeroplanes and helicopters for applying dusts to horticultural crops, and some recently tried helicopters are described and illustrated.

772. BRANNON, D. H., AND BARTRAM, R.  
Effectiveness of airplanes as applicators of insecticides.  
*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 143-5.

Dusting apple orchards with DDT plus parathion or tetraethyl-pyrophosphate from the air gave quite good control of codling moth and spider mite in 1949 but only fair to poor control of woolly aphid. Some of the advantages and disadvantages of this method of applying insecticides are enumerated.

### Insecticidal plants.

773. CRANDALL, B. S.  
Leaf diseases of Peruvian barbasco, *Lonchocarpus utilis*.  
*Phytopathology*, 1950, 40: 34-43, bibl. 12, illus.

Three foliage diseases of barbasco in Peru are a rust (*Dicheimia archeri* Cummins), a target spot (*Pellicularia filamentosa* (Pat.) Rogers) and a leaf wilt (*Cephalosporium deformans* sp. nov.). Only occasionally do they cause severe losses. Selection of resistant plants with high rotenone content is contemplated.

774. NIEUWSTRATEN, J. P.  
Het stekken van derris met behulp van synthetische groeistoffen. (Vegetative propagation of derris by single-noded cuttings, treated with root-inducing substances.)  
[English summary 2 pp.]  
*Meded. alg. Proefst. Landb. Buitenzorg* 91, 1949, pp. 18, bibl. 5.

*Derris elliptica* is usually propagated by means of well-ripened stem cuttings bearing from 3 to 12 buds. By the use of single node cuttings of soft material treated with a root-inducing growth substance, it was found possible to obtain from 6 to 50 times as many plants from the same amount of material. 0.2% alpha-naphthaleneacetic acid gave better results than 1.0% indoleacetic acid, and was best applied in powder form with carbon as carrier. In these propagating trials the importance of an open rooting medium is clearly demonstrated. A cutting compost of 3 parts sand: 1 part rice husks proved satisfactory. It was also shown that softwood leafy cuttings need better soil aeration than can be provided by usual soil management practices. Beds should be cultivated to a depth of 50-60 cm. and the top soil kept open for the first fortnight after planting.

775. RAO, K. H.  
Pyrethrum cultivation at Nanjanad.  
*Madras agric. J.*, 1950, 37: 28-33, bibl. 8.

The cultivation of pyrethrum is described briefly, as are several field experiments carried out at the Agricultural Research Station, Nanjanad. Results from the latter, which are tabulated, indicate: (1) Plants raised from seed gave significantly better yields over 4 years than plants raised from slips, though the latter flowered 6 months earlier. (2) Variations in spacing from  $1\frac{1}{2} \times 1$  ft. to  $2\frac{1}{2} \times 2\frac{1}{2}$  ft. showed no significant differences, but  $2 \times 1\frac{1}{2}$  ft. is to be preferred as simplifying intercultural. (3) Although four pruning treatments did not show significant differences, root pruning done in May before the onset of the monsoon gave the highest yields of flowers, which is in general agreement with results obtained in Kenya. (4) Dressings of  $P_2O_5$ , prawn dust and lime did not increase yields significantly.

(5) A pyrethrin content of 1.28% is recorded, which compares favourably with that of foreign samples.

### Noted.

776. a DEPARTMENT OF AGRICULTURE FOR SCOTLAND.  
Raspberry diseases in Scotland. Strawberry diseases in Scotland.  
*Leaflets Dep. Agric. Scot.* Nos. 7 and 9 (n.s.), 8 pp. each, illus., 4d. each.
- b FINK, H. C.  
*Prunus tomentosa* as an index plant for necrotic ring spot of sour cherry.  
Abstr. in *Phytopathology*, 1950, 40: 9.
- c FINLEY, J.  
Orchard mouse control.  
*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 67-9.  
Practical suggestions on poison baits.
- d GOODEY, T.  
Laboratory methods for work with plant and soil nematodes.  
*Tech. Bull. Minist. Agric. Lond.* 2, 1949, pp. 19, bibl. 19, illus.

- e HALLER, H. L.  
Analysing new insecticides. A review of methods of analysis and limitations.  
*Soap*, 1949, 25: 127-9, 155-7.
- f MORSTATT, H.  
Stand und Ziele wissenschaftlicher Pflanzenpathologie. (Scientific plant pathology; its present position and aims.)  
Reprinted from *Zeitfragen PflSch.*, 1949, pp. 13.
- g PYRETHRUM AGRICULTURAL RESEARCH ADVISORY COMMITTEE.  
Preservation of pyrethrins. Practical hints to pyrethrum growers.  
[Publ.] Office of the Executive Officer, Pyrethrum Board of Kenya, [received 1949], pp. 6.
- h SIEVERS, A. F., AND OTHERS.  
Insecticidal tests of plants from tropical America.  
*J. econ. Ent.*, 1949, 42: 549-51, bibl. 2.
- i VENKATARAMAN, T. M.  
Pyrethrum (*Chrysanthemum cinerariaefolium*).  
*Indian J. Hort.*, 1949, 6: 3/4: 22-7, bibl. 19.  
A review of literature.

## WEEDS AND WEED CONTROL.

(See also 502, 930, 1177, 1178.)

### Weed control in vegetables.

777. NORTH CENTRAL WEED CONFERENCE [U.S.A.].  
Policy Committee's report.  
*Agric. Chemls*, 1950, 5: 40-3.

The report of the research committee includes recommendations on chemical weed control in horticultural crops, especially in carrots, onions, sweet corn, potatoes, asparagus and strawberries. On the whole, however, much more research is required and it must be kept in mind that in horticulture chemicals are an aid to cultivation but not a substitute for it. The control of woody plants with 2,4,5-T is also discussed. [For previous report see *H.A.*, 19: 2064.]

778. STAIRS, H. F.  
Herbicide experiments and demonstrations in New Brunswick in 1948.  
*Proc. 2nd Mtg, East. Sect. Nat. Weed Cttee*, Ottawa, 1949, pp. 36-7.

These include the use of Herbate P.70 on strawberry beds and Varsol on carrots and parsnips. One-year-old ever-bearing strawberries were sprayed with Herbate P.70 at the rates of 12½ and 25 oz. 2,4-D acid per acre. Weed control was about 75%, but the stolons, petioles and fruit stalks reddened and twisted badly, and berries were small and late in ripening. Older plants of Senator Dunlop, given the same treatment, showed less injury and the fruit at harvest time was normal. Varsol was applied at the rate of 60 gal. per acre in a band 4 in. wide along the rows of carrots and parsnips. Weed control was excellent and there was no damage to the crop.—Dep. Agric., Fredericton, N.B.

779. CARTIER, R. D., AND DION, A.  
Weeding onions by chemicals.  
*Proc. 2nd Mtg, East. Sect. Nat. Weed Cttee*, Ottawa, 1949, pp. 17-22.

At the Federal Experiment Sub-station, Ste. Clothilde, 4 herbicides were tested for pre-emergence control of weeds in onion seedbeds. Sinox gave the greatest percentage kill, followed by calcium cyanamide, stove oil and Aero cyanate, in that order. Aero cyanate, however, proved good as a post-emergence herbicide if used when the weeds were very small. In preliminary trials a new chemical, ethyl xanthate of potassium, gave good post-emergence control of weeds, and appeared to stimulate the growth of the onion seedlings.—Quebec Dep. Agric.

780. HELSON, V. A., AND MINSHALL, W. H.  
Some effects of herbicidal oils on the physiology of umbelliferous crop plants and weeds.  
*Proc. 2nd Mtg, East. Sect. Nat. Weed Cttee*, Ottawa, 1949, pp. 74-5.

The application of a petroleum naphtha (boiling range 300-400° F.) disrupted completely and immediately the photosynthesis of all plants tested. This disruption was permanent for mustard but temporary for parsnip. Parsnip was therefore able to survive the application of this oil, while mustard was killed. Transpiration also ceased permanently in mustard, but in parsnip it recovered after a temporary reduction. This suggests that an interference with the water supply to the leaf cells may be the factor responsible for the disruption of photosynthesis. [See also *H.A.*, 19: 3008 for article apparently covering same ground.]



781. ROBB, O. J.

**Chemical weed control in young vegetable crops.***Proc. 2nd Mtg, East. Sect. Nat. Weed Cttee*, Ottawa, 1949, pp. 23-4.

Results are briefly noted of the following treatments: *pre-emergence*: granular cyanamide on early-sown peas and onions, and late-sown onions, beets and carrots; Stoddards Solvent on early- and late-sown onions, beets and carrots; *post-emergence*: Aero cyanate on early-sown onions, and late-sown onions, beets and carrots; Stoddards Solvent on carrots and other umbelliferous crops.—Vineland Station, Ontario.

782. FERGUSON, W., AND OTHERS.

**Weed control in vegetable crops.***Proc. 2nd Mtg, East. Sect. Nat. Weed Cttee*, Ottawa, 1949, pp. 24-30, bibl. 12.

A brief review of the main lines of development in weed control in vegetable crops is followed by a record of experiments made during 1947 and 1948 in the Division of Horticulture, Central Experimental Farm, Ottawa. (1) Various herbicides were applied to asparagus in June during the cutting season. Sinox, Varsol and Aero cyanate gave inefficient weed control; 2,4-D killed all weeds except grasses, and only the spears of asparagus that were above ground were injured; calcium cyanamide killed all weeds, including grasses, and did no damage to the asparagus. (2) Used as a pre-emergence spray, oil (Varsol) gave good weed control for 3 weeks, but affected the germination and growth of beet, lettuce and spinach; carrots, onions and turnips germinated and grew satisfactorily. In further tests with beet, however, Varsol and 2% Aero cyanate gave very good weed control without injury to the crop. (3) Varsol was very effective as a post-emergence spray on carrots.

**Herbicides in general and particular.**

(See also 498, 502.)

783. HOLMES, E.

**Up-to-date weedkillers.***Pl. Prot. Overs. Res.*, 1949, 1: 3: 6-18.

An account of modern weed-killers, with lists of weeds that are susceptible, moderately susceptible, moderately resistant and resistant to Agroxone at 2 gal. or 4 cwt. per acre.

784. THOMAS, K. M., AND SRINIVASAN, A. R.

**Weed-killers.***Indian Fmg.*, 1949, 10: 101-6, illus.

Following a general account of weed-killers, the effects noted at Coimbatore of spraying various weeds with MCPA at strengths ranging from 0.05% to 0.4% are summarized. Twenty-four species including aquatic weeds are listed as being killed by solutions up to 0.2%. Four other species were killed by solutions of 0.2 to 0.4%, provided spraying was done at the right stages of growth. Eleven resistant species are also listed, and of these 10 were also resistant to Extar Sandoz, a dinitro-cresol, at 2.0%, although one of them succumbed when the two weed-killers were used in combination. Among 21 non-cereal crops tested, all except potatoes proved very sensitive to 0.2% MCPA. The general rate of application used throughout was 100 gallons per acre.

785. GRIGSBY, B. H., AND OTHERS.

**Chemical weed control.***Circ. Bull. Mich. agric. Exp. Stat.* 214, 1949, pp. 36, illus.

Directions to growers for the use of various types of chemical weed-killers are followed by notes on the most suitable methods of weed control for specific farm and horticultural crops.

786. IVENS, G. W., AND BLACKMAN, G. E.

**The effects of phenylcarbamates on the growth of higher plants.**Reprinted from *Symp. Soc. exp. Biol.* No. III, Growth, 1949, pp. 266-82, bibl. 57, illus.

A report of an investigation to determine the factors underlying the differential susceptibility of plants to poisons of the phenylurethane type, and to estimate their value as selective herbicides, with special reference to the control of graminaceous weeds.—University of Oxford.

787. BLACKMAN, G. E., HOLLY, K., AND ROBERTS, H. A.

**The comparative toxicity of phytocidal substances.**Reprinted from *Symp. Soc. exp. Biol.* No. III, Growth, 1949, pp. 284-317, bibl. 34.

This series of investigations, started in 1941, was designed to determine the relative toxicity of 4 groups of phytocidal substances, i.e. strong acids, copper salts, aryl nitro compounds and growth substances, with the object of developing new techniques of weed control in a variety of crops. The inter-relationship between plant species, stage of development and herbicide is demonstrated, and the mode of action of these 4 groups of compounds is discussed.—University of Oxford.

788. AUDUS, L. J.

**The biological detoxication of 2:4-dichlorophenoxyacetic acid in soil.***Plant and Soil*, 1949, 2: 31-5, bibl. 12.

By making use of a soil perfusion technique it has been shown that the detoxication of 2:4-dichlorophenoxyacetic acid in garden loam is due almost entirely to the activity of micro-organisms. Preliminary experiments suggest that the process does not involve oxidation. There are also indications that the decomposition products may include a root growth stimulant. [Author's summary.]—Bedford College, London University.

789. GAMMON, W. M.

**Damage from 2,4-D on O.A.C. Campus—June 1948.***Proc. 2nd Mtg, East. Sect. Nat. Weed Cttee*, Ottawa, 1949, pp. 33-5.

The campus of Ontario Agricultural College was sprayed with a butyl ester of 2,4-D at the recommended concentration in June 1948. Two months later a survey was made of the trees and shrubs in the area. Damage was noted on 32 species, including many ornamentals. The damage symptoms shown by each species are recorded.

790. MULLISON, W. R., AND HUMMER, R. W.

**Some effects of the vapor of 2,4-dichlorophenoxyacetic acid derivatives on various field-crop and vegetable seeds.***Bot. Gaz.*, 1949, 111: 77-85, bibl. 3, illus.

Investigations were carried out to determine whether 2,4-D derivatives are sufficiently volatile to affect the viability or subsequent development of dry seeds. It was found that aliphatic (1-5 carbon) esters of 2,4-D and the isopropyl ester of 2,4,5-trichlorophenoxyacetic acid are sufficiently volatile adversely to affect the germination of many species of field-crop and vegetable seeds exposed to such vapours. The injury is proportional to the time of exposure. The higher aliphatic esters (4-5 carbon) of 2,4-D are less volatile than the lower esters (1-3 carbon). The sodium and alkanolamine salts of 2,4-D are apparently not sufficiently volatile to affect the germination of air-dried seeds. The ester vapour appears to be absorbed on the seed coat and does not enter the dry seed before germination.

791. EAMES, A. J.

**Comparative effects of spray treatments with growth-regulating substances on the nut grass, *Cyperus rotundus* L., and anatomical modifications following treatment with butyl 2,4-dichlorophenoxyacetate.**

*Amer. J. Bot.*, 1949, 36: 571-84, bibl. 4, illus.

Of several growth-regulating substances sprayed, for comparative effect, on plants of nut grass at a concentration of 3,000 p.p.m., 2,4-D in tributyl-phosphate and kerosene killed the plants in about 1 day; butyl 2,4-dichlorophenoxyacetate and butyl 2,4,5-trichlorophenoxyacetate in 2 treatments killed most of the plants in about 2 weeks. The other substances were slower in effect or non-effective. The modifications in plants sprayed with butyl 2,4-dichlorophenoxyacetate are described. Most of the internal modifications in this monocotyledon are similar to those found in the dicotyledonous bean plant. The stimulus has two types of effect: some tissues and parts of organs—such as leaves—are stimulated to mature at once in abnormal form; other tissues—such as those in stems—become abnormally meristematic under the stimulus, and form abnormal tissues continuously for some time or as long as the organ or plant lives. The opinion that in many plants the stimulus of various growth-regulating substances continues for various periods of time is probably based on (1) the continuing activity of the abnormal meristems; and/or (2) the development, long after treatment, of dormant buds injured (while growing) before dormancy. New tissues and organs formed after treatment are not affected. [From author's summary.]—Cornell University, Ithaca.

792. EAMES, A. J.

**Histological effects of treatments with growth-regulating substances of 2,4-D group.**  
*Science*, 1949, 110: 235-6, bibl. 2, illus.

The author makes a comparison of the internal modifications occurring in monocotyledons and dicotyledons as a result of treatment with 2,4-D. The comparison is based on recent anatomical studies of treated nut grass [see *H.A.*, 20: 791] and bean plants [see *H.A.*, 19: 1191]. Although injury in the bean plant is far more conspicuous externally than in the nut grass, because of the difference in method of growth, the modifications in both monocot. and dicot. are fundamentally the same.—Cornell University, Ithaca.

*Weed control in sugar-cane.*

793. M.-L., H. [MARTIN-LEAKE, H.].

**A problem of weed control.**

*Int. Sugar J.*, 1949, 51: 14-15.

The sugar cane crop in Louisiana has in recent years been invaded by Johnson grass to such an extent that in some cases yields of cane have been reduced by 50%. This subject is discussed in a series of papers presented to the Agricultural Section of the American Society of Sugar Cane Technologists in 1947 and 1948. Abstracts of some of these papers, dealing with the need for longer rotations and with control of the grass by chemical means, are given here.

794. FARWELL, F. E.

**Johnson grass and crop rotation.**

*Sugar Bull.*, 1948, 26: 168, from abstr.

*Int. Sugar J.*, 1949, 51: 80.

The economic aspects of crop rotation for the control of Johnson grass are considered. If cane land is put down to grass for 2 or 3 years, elimination is slow. A quicker system, and one which has been tried out on a plantation scale, consists of ploughing out all stubble in the autumn and sowing melilotus or oats. These will be ploughed in, and fallow ploughing and harrowing repeated till cane is planted. Melilotus is undersown to this plant cane. Maize, if it must be grown, is planted in straight rows on the land least infected, and left unthinned.

795. KLINGMAN, G. C.

**Pre-emergence control of Bermuda grass and Johnson grass with 2,4-D.**

*Agron. J.*, 1949, 41: 587-9, illus.

Pre-emergence treatment with the triethanolamine form of 2,4-D, at 20 lb. acid equivalent per acre, resulted in complete eradication of Bermuda grass whether the land had been left undisturbed or heavily disced before treatment, though on land that had been burnt, an occasional plant survived. With post-emergence treatment the young stems and leaves were stunted but continued to live. It is believed, however, that these above-ground parts might be controlled like annual weeds soon after 2,4-D treatment. Kentucky bluegrass and orchard grass, growing on the same plots, were killed only on the heavily disced areas. 10 lb. 2,4-D acid equivalent per acre gave effective control when the ground had first been well settled by rain. The isopropyl ester of 2,4-D was used in treatments of Johnson grass. The same general results were obtained on the disced and post-emergence treated plots. Seeds of Johnson grass deep in the soil were still viable after treatment. After 8 weeks, with nearly 10 inches of rainfall, only slight residual effect remained in loam soil treated with 20 lb. acid equivalent per acre.—N.C. State College, Raleigh.

*Noted.*

796.

a ANDERSON, E. G.

**Herbicidal products registered for sale in Canada during 1949.**

[*Mimeo. Publ.*] *Dep. Agric. Canada*, 1 Nov., 1949, pp. 13.



- b BLACKMAN, G. E.  
Modern weed control.  
Reprinted from *Fmr and Stk-Breed. Yearb.*,  
1949, pp. 54-8, illus.  
Review of progress in selective weed control  
since 1939.
- c BROWN, R., AND ROBINSON, E.  
Effect of the *Striga* germination stimulant  
on the respiration of *Striga* seeds.  
*Nature*, 1949, 164: 1057, bibl. 7.
- d GARVIN, J. W., AND HAGAR, A. W.  
Extensive use of 2,4-D. Important Canadian  
Agricultural Chemicals Development in  
1948.  
*Pl. Prot. Overs. Rev.*, 1949, 1: 3: 19-23.
- e VON HOFSTEN, C. G.  
The campaign against weeds.  
*Pl. Prot. Overs. Rev.*, 1949, 1: 3: 24-7,  
translated from Swedish article in *Lant-  
mannen* 20, 15 May, 1948.

## VEGETABLES AND MISCELLANEOUS TEMPERATE CROPS.

*General.*

(See also 495, 496, 499, 528, 529, 535g, k, 649, 760,  
1181, 1183, 1186, 1194.)

## 797. HORNE, F. R.

## Plant breeding work at Svalöf.

*Agriculture, Lond.*, 1950, 56: 467-72.

An account of the development and work of the Plant Breeding Station at Svalöf, Sweden, which was established in 1886. The station is primarily concerned with cereals and agricultural crops, including potatoes and root crops, but at the beginning of the Second World War oil and fibre plants began to receive close attention.

## 798. PHILP, J.

## Research on vegetables.

*N.A.A.S. quart. Rev.*, 1949, No. 6, pp. 51-5.

The author, who is Director of the new National Vegetable Research Station, Wellesbourne, Warwickshire, gives an outline of the lines along which it is proposed that the station shall develop. The general aim is the practical one of helping the vegetable producer, both professional and amateur, and indirectly the consumer too, by finding ways of increasing crop yields, improving crop quality and reducing production costs. The breeding of improved varieties, hitherto carried out exclusively by seedsmen and growers, will form an important part of the work, and a sub-station is being established in Essex for seed multiplication under conditions known to be highly suitable for the purpose. Old-established methods of crop culture will be examined in the light of constantly changing conditions, and this will involve studies of manures and soils, irrigation practices, pests and diseases, and methods of harvesting and marketing. On mechanization there will be close co-operation with the National Institute of Agricultural Engineering, and there will also be a close association with the N.A.A.S. who are responsible for sub-stations and demonstration stations that are being set up in various parts of the country.

## 799. ARRÓNIZ, C.

Hortalizas españolas de tallos, hojas y flores.

(Some Spanish vegetables.)

[*Publ.*] *Minist. Agric. Madrid*, pp. 137, 10 pesetas, [No date, received 1950].

A useful handbook for the private gardener or small-holder in Spain. Simple but adequate directions are given for the cultivation of the following dozen vegetables: Swiss chard beet, globe artichoke, celery, cardoon (*Cynara cardunculus*), cabbage, brussels sprouts, cauliflower, endive, asparagus, spinach,

lettuce and parsley. Most of the varieties recommended have been tested at the Estación Experimental de Horticuultura y Jardinería at Aranjuez, and found suitable for cultivation under Spanish conditions. Recommended dates of planting, harvesting, etc., therefore apply to the district round Aranjuez (near Madrid). In many cases directions are given for obtaining a succession of crops throughout the year, and special attention is paid to methods of seed production. Information on pest and disease control is somewhat scanty. The author hopes to follow this publication with a similar one on root and fruit vegetables grown in Spain.

## 800. NAIK, K. C.

## Vegetable seed production and supply in the province of Madras.

*Indian J. Hort.*, 1944, 2: 72-81, bibl. 6 [received 1949].

Evidence is given to show that the seed production of European type vegetables in Madras is far from satisfactory as regards purity, viability, and the use of varieties adapted to different conditions of soil and climate. Suggestions are made for improving the position by research and by the regulation of seed production and supply.

## 801. RICHHARIA, R. H., AND ROY, R. S.

## Vegetable seed production and its economics in Bihar.

*Indian J. Hort.*, 1946, 4: 27-38, bibl. 3 [received 1949].

This paper deals with the production of seed, on a commercial basis, of 13 different vegetable crops: bean, carrot, cauliflower, cucumber, egg plant, French bean, garden pea, gourd, lettuce, onion, radish, tomato and turnip.

## 802. BYKOVSKIĬ, V. JA.

## On overcoming seasonal difficulties in growing vegetables in Siberia. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, 12: 51-5, illus.

The problem of providing fresh vegetables in the industrial regions and towns of Siberia is set out. The climate is continental with hard frosts in winter, cold winds and snowstorms in February, and often cold weather with snow in May. Trials under such conditions are being conducted at the west Siberian vegetable experiment station in the Altai region for growing vegetables in the open, in hotbeds and greenhouses. Special attention is given to the cultivation of tomatoes, cucumbers, cabbages and carrots.

803. POST, J. J.

Samenhang tussen weersfactoren en opbrengst van tuinbouwzaden. (Relation between weather conditions and yield of horticultural seeds. [English summary  $\frac{1}{2}$  p.] *Meded. Dir. Tuinb.*, 1950, 13: 23-31.

A statistical investigation of the yield of French beans in Holland showed that it is favourably affected by: (1) temperatures above normal during June, (2) relatively few rainy days during May II-June II [the Roman numerals indicate the decades of the month], (3) more hours of sunshine than are normally experienced during the period from May II up to and including July, (4) less cloudiness than normal during May III and June II.

804. AYERS, A. D., AND HAYWARD, H. E.

A method for measuring the effects of soil salinity on seed germination with observations on several crop plants.

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 224-6, illus.

Information is needed on the relative salt tolerance of the germinating seeds of various crops. A precise method for obtaining such information is presented, together with observations on the tolerance of various seeds, including red kidney beans. Although these beans, which are known to be very sensitive to salinity after germination, were also found to be sensitive during germination, these studies indicate that in general there is no relationship between the salt tolerance of a plant during germination and that during its later stages of growth.—U.S. Regional Salinity and Rubidoux Labs., U.S. Dep. Agric., Riverside, Calif.

805. OSNICKAJA, E. A.

Disinfecting vegetable seed. [Russian.] *Sad i Ogorod* (Orchard and garden), 1949, No. 11, pp. 72-4.

The author mentions a number of vegetable diseases disseminated by the seed. The use of granosan and sublimate in disinfecting tomato, cabbage and carrot seed is described. The treatment of tomato seed is said not only to suppress fungal diseases but also to reduce the activity of viruses.

806. BEAR, F. E., TOOTH, S. J., AND PRINCE, A. L.

Variation in mineral composition of vegetables.

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 380-4, bibl. 10.

The mineral composition of plants is affected by environmental factors such as soil type, fertilizer practice, and climate. Wide variations in these factors are found in different parts of the United States. The authors here report on a study of the mineral composition of 204 samples of cabbage, lettuce, snapbeans, spinach and tomatoes taken from 10 States. Wide variations were found in the mineral content of vegetables of the same variety. In general, ash, Ca, and cation-equivalent values tended to increase, and Mg values to decrease from south to north. Ash, cation-equivalent, Ca, Mg, K, B, Fe, Mo, Cu, and Co values tended to increase from east to west while Na and Mn values decreased. Variations in the individual species are recorded.—N.J. agric. Exp. Stat.

807. BOWER, C. A., AND WADLEIGH, C. H.

Growth and cationic accumulation by four species of plants as influenced by various levels of exchangeable sodium.

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 218-23, bibl. 22.

The plant species used included dwarf red kidney bean and garden beet. The effects of 6 levels of exchangeable Na (i.e. 0, 15, 30, 45, 60 and 75% of the cation exchange capacity) on their growth and accumulation of cations were determined. Beans were found to be very Na-sensitive. Growth fell markedly at the 15% level of exchangeable Na, and was almost completely inhibited at the 3 highest levels. Beet, however, was very Na-tolerant, significant reduction in growth occurring only at the highest Na-level used. Accumulation of Ca, Mg and K by all species tended to decrease and that of Na to increase progressively as higher proportions of exchangeable Na were supplied. The extent of these changes in cationic content varied considerably with the species of plant studied, and between the roots and aerial parts of the plants. This variation is discussed in relation to the observed Na-tolerance of the various species.—U.S. Regional Salinity and Rubidoux Labs., U.S. Dep. Agric., Riverside, Calif.

808. CLORE, W. J., AND VINCENT, C. L.

Vegetable fertilizer studies in the Walla Walla area.

*Bull. St. Coll. Wash. Inst. agric. Sci.* 508, 1949, pp. 10, illus.

Notes are given on (1) plot arrangement and plot size, (2) applying the fertilizer and preparing the land, (3) cropping system, varieties, planting distances, and cultural practices, and (4) record taking. Yield data are recorded for early potatoes, onions, sweet corn, tomatoes, and spinach. The results are discussed.

809. ACHARYA, C. N.

Further manurial trials with town compost, 1945-46.

*Indian Fmg.*, 1948, 9: 16-17 [received 1949].

The Provincial Departments of Agriculture in India are carrying out field trials to assess the value of town refuse compost under their local conditions. Some of the preliminary reports, covering the period 1945-46, are summarized here. The results indicate that the application of town refuse compost produces a higher yield of vegetables than the application of farmyard manure.

810. BECKER, M. H., AND MUMFORD, D. C.

Sprinkler irrigation costs for vegetable crops in the Willamette Valley, Oregon.

*Stat. Bull. Ore. agric. Exp. Stat.* 463, 1949, pp. 20, illus.

This information on the costs of sprinkler irrigation for pole beans, table beet, carrots and sweet corn, grown for processing, was obtained as a result of a survey in the Willamette Valley in 1946. Costs are analysed, and the major factors affecting these costs, i.e. depreciation, interest, power and labour, are discussed. In conclusion it is suggested that irrigation costs might be reduced by (1) modifying the cropping programme to make greater use of existing equipment, (2) disposing of excess equipment where present capacity is larger



than necessary, and (3) redesigning any system that has become inefficient.

811. WARNE, L. G. G.

**The personal factor in thinning.**

*Fruitgrower*, 1950, 109: 28.

Variation in the "thinning efficiency" of workers represents a possibly serious source of error in experimental work, especially where small distances are involved. The results of several experiments demonstrated that reduction in plant stand, due to this personal factor in thinning, may be responsible for an 8 or 9% reduction in yield of beet and carrot crops.—University of Manchester.

812. ÅBERG, B.

**Changes in the ascorbic acid content of darkened leaves as influenced by temperature, sucrose application, and severing from the plant.**

*Physiol. Plant. Copenhagen*, 1949, 2: 165-83, bibl. 16.

1. The rate of the adaptation of the ascorbic acid content to lowered light intensities has been studied for parsley, spinach and kale plants. The adaptation period increases with decreasing light intensity, and is perhaps conditioned by morphological as well as metabolic factors. 2. Some experiments on the effect of supplementary artificial light on the ascorbic acid content of parsley, spinach and lettuce show strong positive effects especially for the midwinter period. 3. The rate of the ascorbic acid decrease in detached, darkened leaves rises with the temperature, the  $Q_{10}$ -values lying in the range from 2 to 3 (parsley, spinach, lettuce), thus indicating that ordinary chemical reactions are involved. 4. For attached leaves the  $Q_{10}$ -values may rise to 4-6 (spinach, parsley), thus indicating that growth processes are perhaps involved in the complex system, leading to the more rapid decrease in attached leaves than in detached ones (direct comparisons made for parsley, spinach and lettuce leaves) or to an initially higher content in the detached leaves when illuminated (parsley). 5. When the darkened leaves are floating in a 10% sucrose solution instead of water, the decrease of their ascorbic acid content is almost arrested (spinach, lettuce) or changed to an initial increase (parsley). 6. For detached tomato leaves the effects of sugar feeding are only slight, but instead there is an initial increase in their ascorbic acid content at lower temperatures even without external sugar application. It is probable that in this case the internal sugar concentration is augmented by starch hydrolysis. 7. The bearings of the results upon the problems of ascorbic acid metabolism and translocation are discussed. [From author's summary.]—Royal agric. College, Uppsala.

813. SUGAWARA, T.

**The sex of plants and vitamin contents.**

[Japanese, English summary 10 lines.]

*J. hort. Ass. Japan*, 1948, 17: 204-8, bibl. 12.

The leaves of typical male and typical female plants of spinach and asparagus were analysed at the time they were beginning to flower. Determinations were made of the total ascorbic acid, provitamin A, reducing sugars, non-reducing sugars, total nitrogen, and chlorophyll. Pistillate plants had a higher average

percentage of total ascorbic acid,  $\beta$ -carotene, reducing sugars, total nitrogen, and chlorophyll than staminate plants under the conditions of these experiments. Concentrations of  $\alpha$ -carotene, cryptoxanthin, and total sugars were almost equal in the staminate and pistillate plants, but the non-reducing sugars were much more abundant in the staminate than in the pistillate plants. [Author's summary.]—Laboratory of Agronomy, Faculty of Agriculture, Tokyo University.

814. STOLL, K.

**Modellversuche zur Wirkung der edaphischen Dürre auf die Entwicklung von Leguminosen. (Experiments on the effect of edaphic drought upon legumes.)**

[Publ.] *Inst. f. Bodenk. Wien*, 1949, pp. 51, bibl. 20.

A study was made on that type of edaphic drought which occurs when the upper layers of the soil dry out as a result of evaporation and of water consumption by plants. Long wooden boxes as described by Werner [see *H.A.*, 18:1569] were used to obtain the soil moisture gradient desired. The plants on which these experiments were carried out at the horticultural institute of the Agricultural College, Vienna, included beans and peas. Among these, certain sturdy varieties of dwarf beans were found to be particularly resistant to wilting, and it is suggested that sturdiness is a characteristic which might serve as a guide in the breeding for drought resistance. Particular attention, however, should be paid to the development of a more efficient root system, and here the breeder has still considerable scope. Characters to be aimed at are: the formation of several main roots, rapid penetration into the deeper soil layers, the ability to form a strong cuticle and the capacity to grow new roots rapidly with an abundant development of absorption roots. Cultural measures should be designed to promote root growth. Root nodules were found to be adversely affected by drought but to develop again when a favourable moisture level was restored.

815. OGILVIE, L.

**Diseases of vegetables.**

*Bull. Minist. Agric. Lond.* 123 (3rd edition), 1949, pp. 73, illus., 3s. 6d.

This is a revision of the second edition [*H.A.*, 15: 609]. New illustrations are eight coloured photographs.

816. MOORE, W. D.

**Flooding as a means of destroying the sclerotia of *Sclerotinia sclerotiorum*.**

*Phytopathology*, 1949, 39: 920-7.

Losses caused by *Sclerotinia sclerotiorum* have long been serious in the United States in celery and lettuce and in the last 10 years the disease has become a serious problem in tomatoes, potatoes, beans, peppers, and other vegetables. It is shown that when the sclerotia of this fungus are flooded in marl, muck, or sandy soils, they decay completely within 23 to 45 days.—Florida Agric. Exp. Stat.

817. YOUNG, P. A.

**Charcoal rot of plants in East Texas.**

*Bull. Tex. agric. Exp. Stat.* 712, 1949, pp. 33, bibl. 91, illus.

The fungus *Macrophomina phaseoli* causes charcoal rot of at least 284 species of plants, which are here

listed. The symptoms on 30 cultivated host plants, including some garden vegetables, are described. Crops that have their seedling stages and those that mature in cool or rainy weather are not damaged seriously by the disease. Methods of crop production that invigorate the plants apparently increase their resistance to charcoal rot. Resistant varieties of some crops help in control, as does also enough rain or irrigation water in the latter part of the season.

818. CUMBER, R. A.

The green vegetable bug *Nexara viridula*.

N.Z. J. Agric., 1949, 79: 563-4, illus.

The green vegetable bug is described and its life cycle outlined. It attacks a wide range of cultivated plants including beans, tomatoes, potatoes, cabbages, cauliflowers, pumpkins, marrows, grapes, passion fruit and rhubarb; damage to peaches has been reported. A small hymenopterous egg parasite, *Microphannus basalis* Wall., has recently been introduced into New Zealand. Reference is made to promising results with DDT in Australia for control of the pest.

819. BODENHEIMER, F. S.

Problems of vole populations in the Middle East. Report on the population dynamics of the Levant vole (*Microtus guentheri* D. et A.). [Hebrew summary.]

[Publ. Res. Coun. Israel, Jerusalem, 1949, pp. 80, illus., bibl. 34, 250 mils. or 5s.

Of vegetables winter crops such as potatoes, carrots, beets and cauliflowers suffer from this vole, and of the summer vegetables tomato, eggplants and pepper are sometimes damaged. Suggestions are made for comprehensive control measures.

*Individual vegetables.*

(See also 498, 503, 730, 1174, 1177, 1178.)

820. PANOV, M. A.

Producing artichoke seed. [Russian.]

Sad i Ogorod (Orchard and garden), 1949, No. 12, pp. 55-7.

A method involving vernalization of the seed has been developed in Russia for inducing artichoke plants [*Cynara scolymus*] to produce edible heads in the same year the seed is sown, but such plants do not ripen their seeds. Experiments have shown, however, that plants, when left to overwinter in the open ground, flowered in July and bore heads with ripe seeds in August.

821. WELLENSIEK, S. J.

De selectie van eenjarige mannelijke aspergeplanten. (The selection of one-year-old male asparagus plants.) [English summary ½ p.]

Meded. Dir. Tuinb., 1949, 12: 876-89, bibl. 26, illus.

A review of the literature indicates that male asparagus plants outyield plants unselected for sex by some 25%. The selection of one-year-old male plants is difficult because normal flowering does not start before the second year and the use of two-year-old plants should be avoided. The author's own observations indicate: (1) Asparagus plants do not respond to vernalization and they react neutrally to photoperiodic differences.

(2) Flowering of plants of 9 months and older has been induced by transferring seedlings in the autumn of the year of sowing to a hothouse. High temperature is the determining factor. Practically all early flowering plants are males. (3) Selection for vigour is possible at 3 months old with plants which have been cut with scissors 1 cm. above soil level at 6 weeks from sowing. (4) Attempts at propagation with cuttings failed; division of old crowns has yielded limited success, and division of young crowns offers possibilities.

822. CHOLNOKY, B. J.

Beschouwingen over het kiemen van bonen.

(Observations on the germination of beans.)

Meded. Dir. Tuinb., 1950, 13: 32-55, bibl. 10, illus.

Of the germination methods examined the "rolled towel" test was the most reliable. The results obtained were good, not only because of the quantity of water applied, but also because the absorption of water was guaranteed.

823. BURTCH, L. M., THORNE, D. W., AND WANN, F. B.

The effect of light, soil temperature, and soil moisture on high-lime chlorosis.

Proc. Soil Sci. Soc. Amer., 1948, 13: 394-8, bibl. 9.

A series of pot experiments was conducted on bean plants of the Great Northern variety to determine the effect of light, soil temperature and soil moisture on the development of lime-induced chlorosis. It was found that a high moisture level together with low soil temperature is the condition most conducive to the development of chlorosis. Soil moisture appeared to be the most important single factor, for when irrigation water was applied at a maximum soil moisture tension of 100 cm. of water, nearly all plants showed chlorosis, regardless of temperature or light conditions. When, however, soil was allowed to dry nearly to the wilting point before irrigation, all plants maintained a dark green colour. These results indicate that much of the lime-induced chlorosis of the irrigated regions of the western States of America could be alleviated by the proper use of irrigation. Both abnormally high and low soil temperatures tended to increase the development of chlorosis. Neither quality, intensity nor duration of light seemed of major importance.—Utah agric. Exp. Stat., Logan.

824. KIŠPATIĆ, J.

Prilog poznavanju biologije i suzbijanja bobove rdje, *Uromyces fabae* (Pers.) de By f. sp. *Viciae fabae* de By. (Investigations on the biology and control of broad bean rust.) [English summary 10½ pp.]

Libr. J. sci. tech. agric. Essays, Belgrade, 1949, 1: 2: 3-61, bibl. 121, illus.

Descriptions are given of broad bean rust, its economic importance in various countries, life cycle (teliospores and aecia), host specialization, field resistance trials, and control trials. The best protection was given by bordeaux mixture applied at intervals of 2 to 3 weeks, the sprayed plots showing 20% infection as compared with unsprayed plots 100%. Sulphur dust also gave good results but it had to be applied more frequently.—Univ. of Zagreb, Croatia, Yugoslavia.



## 825. BANGA, O.

De inwendige vleeskleur van krotten: haar beoordeling bij rassenvergelijking en selectiewerk. (The internal flesh colour of table beets: its assessment in comparing varieties in selection work.) [English summary 9 lines.]

*Meded. Inst. Vered. Tuinbgew.* 14, 1949, pp. 16, bibl. 12.

The depth of colour in a beetroot is controlled by genes, by the rate of development of the root and by its stage of development. There is, however, no direct relation between the genetically controlled rate of development of the root and its depth of colour.

## 826. WARNE, L. G. G.

Growth of mangels and long beet.

*Nature*, 1950, 165: 29-31, bibl. 1.

The two varieties of long garden beet, Exhibition Black and Cheltenham Green Top, exhibit a marked wilting of the foliage towards the end of July and the beginning of August, irrespective of any soil moisture deficit. In a discussion of the phenomenon, which was studied in connexion with the rising of mangels above the soil surface, it is suggested that wilting results from an interruption of the intimate contact between lateral roots and the soil. This hypothesis is supported by the fact that the two garden beet varieties produce particularly "clean" roots, indicating the absence of strongly developed lateral roots.—Manchester University.

## 827. SMITH, H. C.

Light-leaf spot of brassicas.

*N.Z. J. Sci. Tech., Sect. A*, 1948, 30: 83-8, bibl. 4, illus.

Light-leaf spot of brassicas (*Gloeosporium concentricum*) is widely distributed on cauliflowers in market gardening areas near Auckland city. Degree of infection varied from 0 to 100% in different crops. Symptoms are leaf distortion and superficial white spore masses on leaves. The disease has not yet been serious enough to warrant control measures. Immune varieties of cauliflowers and cabbages have been found; the former are all late maturing but could be grown if the disease became economically important.—D.S.I.R., Auckland.

## 828. SYLVÉN, E.

Skidgallmyggan, *Dasyneura brassicae* Winn. (The bladder pod midge.) [English summary 16½ pp.]

*Medd. Växtskyddsanst.* 54, 1949, pp. 120, bibl. 56.

Although *Dasyneura brassicae* is primarily a pest of rape, it attacks also other brassica seed crops, usually through holes previously made by the cabbage seed pod weevil, *Ceutorrhynchus assimilis*. DDT is recommended for control.

## 829. PRENTICE, I. W.

Broccoli mosaic.

*Agriculture, Lond.*, 1950, 56: 577-9.

Broccoli mosaic caused by an aphid-borne virus can affect all brassicas, but only causes serious loss in cauliflowers and broccoli, particularly in Devon and E. Kent. Plants infected early produce no heads, while those infected later become very susceptible to frost damage. Recommendations for prevention are: (1) destruction of previous year's brassica plants,

(2) isolation of seedbeds from any brassicas that cannot be destroyed, (3) surrounding seedbeds with less susceptible brassica seedlings, (4) with seedlings raised under frames, fumigating or spraying regularly to destroy aphids.

## 830. HUBER, G. A., AND GOULD, C. J.

Cabbage seed treatment.

*Phytopathology*, 1949, 39: 869-75.

Hot water treatment at 45° C. for 20 mins. caused little or no injury to vigorously germinating cabbage seed and destroyed fungi carried on or in the seed. Such treatment followed by Tersan, 1% by weight, or Arasan 60 hours afterwards proved the most effective treatment.—State College of Washington.

## 831. NESTEROVA, E. I.

Local application of mineral fertilizers on cabbage. [Russian.]

*Doklady vsesojuz. Akad. sel'sk. Nauk S.S.S.R.*, 1950, No. 2, pp. 13-20, bibl. 6.

Localized application of fertilizer (as opposed to broadcasting) to cabbage plants, has a favourable effect on the yield. In the trials described the best results were obtained by applying  $\frac{1}{4}$  or  $\frac{3}{8}$  of a complete NPK fertilizer at the time of ploughing, the other  $\frac{1}{2}$  or  $\frac{1}{8}$  in holes at 8-10 cm. from the plants when planting the seedlings, or 10-15 days afterwards. Localized application of fertilizer improves the market value of the product by increasing the carbohydrate and protein content of the cabbage heads.

## 832. HATT, H. H.

Vitamin C content of an old antiscorbutic: the Kerguelen cabbage.

*Nature*, 1949, 164: 1081-2, bibl. 8.

Since Captain Cook's days explorers of the Antarctic have taken an interest in Kerguelen cabbage (*Pringlea antiscorbutica*), a cruciferous species bearing the name of the island on which it grows in abundance. Cabbages collected by the Australian National Antarctic Research Expedition were analysed for ascorbic acid content and figures are published for various parts of the plant. The heart leaves, the most edible portion, were found to have the highest vitamin C content, viz. 121-190 (average 155) mg./100 g. Some data on the seed fat are also presented.

## 833. GURLEV, A. S., AND ZELENSKAJA, O. A.

The application of chloropicrin for the control of club root of cabbage under glass. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1949, No. 12, pp. 62-4.

The authors describe, with tabulated data, favourable results in disinfecting the soil in frames infested with *Plasmodiophora brassicae*, particularly when, after the application, the soil is covered with rubberoid or bitumen emulsion.

## 834. REID, W. J., JR., AND CUTHBERT, F. P., JR.

Field-plot comparisons of DDT and other new materials for control of caterpillars on cabbage. [Publ.] U.S. Dep. Agric. Bur. Ent. Pl.

*Quar. E-787*, 1949, pp. 17, bibl. 5.

Of all the materials extensively tested DDT was the most effective against mixed infestations of caterpillars. DDT suspension and emulsion sprays were

as effective as, and sometimes superior to, dusts applied at the same dosage. Technical benzene hexachloride was about as toxic as DDT, in equal dosages of active ingredient, to each of the more important caterpillars except cabbage looper, but its effect was not so lasting. A 1% parathion dust compared favourably with 3% and 5% DDT dusts against the caterpillars and was quite effective against the cabbage and turnip aphids.

835. LEYENDECKER, P. J., Jr.

**Carrot blight caused by *Alternaria dauci* appears in New Mexico.**

*Plant Dis. Repr.*, 1949, 33: 431, bibl. 3.

Severe outbreaks of carrot blight have appeared in certain areas of New Mexico. In most fields where the carrots were ready for harvest, the outer leaves were completely destroyed, leaving only two or three young leaves on mature roots. It is believed that the appearance of the disease in epiphytotic form was due to the unusually high rainfall and high humidity during late July and early August. The damage was checked temporarily by aeroplane dusting with a number of commercial copper fungicides.—New Mexico agric. Exp. Stat., State College.

836. JONES, F. G. W.

**A new species of root eelworm attacking carrots.**

*Nature*, 1950, 165: 81, bibl. 2.

A description of the cyst-forming eelworm species, *Heterodera carotae*.—School of Agriculture, Cambridge.

837. RUALA, T. S.

**Cauliflower seed production.**

*Indian Fmg.*, 1949, 10: 57-9.

The usual method of producing cauliflower seed in India is to select plants with desirable heads and to transplant them with a ball of earth round their roots to a convenient plot in which they mature their seed. Experiments in two successive seasons gave the following results: (1) Comparing plants transplanted as above with others allowed to mature their seed *in situ* showed over 6 times the yield of seed in favour of the latter. Viability of the seed was also slightly better, and plants raised from the two lots of seed showed no difference in the quality of heads produced. (2) Comparing transplanting with balls of earth with transplanting bare root showed more than double the yield of seed in favour of the former. (3) Comparing stages of development of the heads at the time of transplanting showed yields of seed in favour of plants with sprouted heads as compared with those with compact heads or heads just beginning to break. (4) Thinning the floral shoots produced no obvious economic improvement, and was detrimental to the yield of seed if more than 25% of the shoots were removed. The general conclusion is that it is best to allow cauliflower to mature seed *in situ*, provided that all inferior plants are removed before flowering begins.

838. JONES, J. O., AND DERMOTT, W.

**"Whiptail" in cauliflower.**

*Nature*, 1950, 165: 248-9, bibl. 4.

In south-eastern England "whiptail" of cauliflowers and broccoli occasionally causes severe losses, especially in dry seasons and on acid or slightly acid soils. In a trial carried out in 1949 on a soil with a pH of

6.0 the untreated plots showed a whiptail percentage of 69, while ground chalk (2 tons per acre), chalk plus sodium molybdate (10 lb./acre) and sodium molybdate (10 lb./acre) reduced the trouble to 31, 12 and 18% respectively. Observations suggest that in certain cases "whiptail" may be due to cultural causes rather than to molybdenum deficiency.—N.A.A.S., Wye, Ashford, Kent.

839. CHEEMA, G. S., NAZARETH, B., AND DHARESHWAR, S. R.

**Improvement of chilli (*Capsicum annum* L.) by selection in the Bombay province.**

*Indian J. Hort.*, 1944, 2: 49-61, bibl. 14 [received 1949].

The investigations described here were carried out between 1931 and 1938. Studies of chilli samples from all parts of the province indicated that nearly all varieties could be grouped into thin- and thick-skinned types. After repeated selection pure lines of important strains were isolated for yield trials. Amongst Deccan types, two, C-2 and C-9, both producing long thin-skinned fruits of good quality, gave higher yields than local Deccan chillies four years running, differences being statistically significant in two of the years.

840. RICHHARIA, R. H., AND ROY, R. S.

**Brinjals [egg plants] in Bihar.**

*Indian J. Hort.*, 1944, 2: 39-40, illus. [received 1949].

A brief note on the cultivation of egg plants with descriptions of 4 varieties selected as superior from 12 growing at the Agricultural Research Institute, Sabour, Bihar.

841. VENKATARAMANI, K. S.

**Some observations on the brinjal [egg plant] bud-worm, *Phthorimoea blapsigona* M.**

*Indian J. Hort.*, 1945, 3: 86-91, bibl. 5 [received 1949].

The larvae of *Phthorimoea blapsigona* boring into, and feeding on, the developing ovary reduces yields considerably, especially during cool months when there is appreciable rainfall. Examination of 22 varieties of egg plant in one year at Coimbatore showed all to be almost equally susceptible. Some degree of parasitism by a species of *Microbracon* was also observed.

842. TARIAN, A. C., AND MOORE, J. E.

**Preliminary tests with seed treatments in prohibiting root-knot nematode infection of cucumber seedlings.**

*Plant Dis. Repr.*, 1949, 33: 447-50.

It was concluded from these tests, in which 27 fungicides were used, that seed treatment of Marketer variety of cucumber was ineffective in reducing infection of seedling roots by root-knot nematode larvae or in increasing the size and quality of yield.—University of Maryland, College Park.

843. WARNE, L. G. G.

**The personal factor in lettuce planting.**

*Fruitgrower*, 1949, 108: 1072.

A small-scale experiment, designed to determine how much of the variation in yield from an acre of lettuces is due to the judgment or skill of the planter, revealed several interesting facts. For different planters, total losses ranged from 10,261 to 17,230 plants per acre,



indicating that a significant proportion of the losses are due to the personal factor in planting. The variation in the number of lettuces cut at first harvest was even greater than that in the total number of lettuces cut. Inexperienced workers tended to overestimate small distances, so did not plant the full number of plants per acre. It is suggested that the use of a measured planting stick for a short while would improve the judgement of the worker and reduce the loss of crop by 2,000-10,000 plants per acre.—University of Manchester.

844. ANON.

"Flash cooling" makes history.

*Market Gr. J.*, 1949, 78: 11: 25.

A new technique for the preservation of vegetables during transport is being applied to lettuce in the Salinas-Watsonville area of California. Before loading into the refrigerated car, packed lettuce is rapidly cooled to 32° or 33° F. in a vacuum tank. This cooling makes it possible to dispense with the usual practice of placing ice in each package and blowing ice over each load. Ice in the car bunkers will supply all the refrigeration necessary.

845. ELLIS, D. E., AND COX, R. S.

Etiological and control studies on lettuce damping-off in North Carolina.

Abstr. in *Phytopathology*, 1950, 40: 8.

Seed treatment with Spergon or Cuprocid, followed by drenches of the carbamate Fermate (1-100) or of thiuram-disulphide Thiosan (1-100) applied at 10-day intervals at  $\frac{1}{2}$  gal. per sq. yd., gave effective and practical control of lettuce damping-off.

846. PROTASOVA, N.

Melons and water-melon in the north. [Russian.]

*Kolhoznoe Proizvodstvo* (Collective farming), 1949, No. 5, p. 29, illus.

The extension of the cultivation of cucurbitaceous plants from the southern to the more northerly regions of Russia is discussed, and instructions are given for growing melons and water-melons in the central zone of Russia, e.g. the Moscow province and the northerly provinces of White Russia and Kazakhstan.

847. ANON.

New watermelon.

*Market Gr. J.*, 1950, 79: 1: 28-9.

A new anthracnose-resistant variety of watermelon, bred by the U.S. Department of Agriculture at Charles-town, S.C., and known as Congo, will be available to growers this year. Congo is a large, semi-long striped melon that matures in about 90 days. The fruits may weigh up to 60 lb., and the total solids content (mostly sugars) is 12%. The variety is susceptible to downy mildew and *Fusarium* wilt.

848. SUGIYAMA, T., AND NISHI, S.

Studies on pruning melons (*Cucumis melo*, L. var. *Conomon*, Makino). [Japanese.]

*J. hort. Ass. Japan*, 1947, 16: 161-71, bibl. 8 [received 1949].

In an experiment with an early form of the Tokyo Melon variety of *Cucumis melo*, some plants had 2 or 4

lateral branches pinched back, others were left untreated. Ten days after the blossoming of the female flowers started there were more flowers on the plants pinched back than on those untreated. Later, however, the reverse applied, and the untreated plants had more blooms than those pinched back. Similar results were shown by the fruit. On the whole there were more fruits on the untreated plants, less on those with 4 and 2 branches pinched back, in that order. Where density of planting is the same the total yields are less when the plants are pinched back.

849. DICKSON, R. C., AND OTHERS.

Cantaloup mosaic investigations in the Imperial Valley 1949.

*Plant Dis. Repr., Suppl.* 187, 1949, pp. 285-6.

Five reports by different authors on the following aspects of cantaloup mosaic: vector studies; the occurrence, distribution, and sources of the cantaloup mosaic viruses in 1949; mosaic reactions of powdery mildew-resistant lines of the muskmelon; cantaloup mosaic, as affected by nitrogen fertilization; present status of the problem of cantaloup mosaic in the Imperial Valley.

850. HIDAKA, Y.

Studies of treatments with plant hormone in *Cucurbita moschata* Duch. [Japanese.]

*J. hort. Ass. Japan*, 1947, 16: 151-3 [received 1949].

On the black-skinned variety of Japanese Southern melon the percentage fruiting of single flowers was 92% when artificially fertilized and 34% when treated with hormone at blossom time. The percentage set of individual flowers, hormone treated, varied with the season. The percentage set from artificial fertilization, hormone treatment, and simultaneous application of pollen and hormone were 92, 34 and 94 respectively. The percentage set and size of fruit by pollen and hormone application varied according to the time of application. The quantity and size of fruit are greatest with hormone treatment, and the taste of the fruit is not affected.

851. MORI, H.

On parthenocarp in *Cucurbita moschata*, Duch. induced by growth promoting substances and their effectiveness for preventing fruit abscission. [Japanese.]

*J. hort. Ass. Japan*, 1947, 16: 154-60, bibl. 8 [received 1949].

Flowers of *Cucurbita moschata* were treated with 0.02% and 0.005% of the potassium salt of naphthaleneacetic acid to prevent fruit drop. Good results were generally shown and the fruit was large. When the applications were made between 12 noon on the day before blossoming and 9 a.m. on the day of blossoming good results were obtained and the fruit was a good size. Applications made on the day previous to blossoming gave slightly inferior results to those from applications on the day of blossoming. With rain-soaked flowers, using 0.03% NAA, better results were obtained than with artificial fertilization. It is concluded that the prevention of fruit drop can be effected both with flowers which cannot be pollinated and with rain-soaked flowers.

852. CHUPP, C., AND CAREW, H. J.  
Muskmelon leaf spots associated with  
magnesium deficiency.

*Plant Dis. Repr.*, 1949, 33: 340.

The symptoms did not suggest magnesium deficiency. It must have been the dry hot weather, which prevailed since May, which actually caused the unusual type of injury where magnesium was lacking.

853. GAGNEBIN, F.  
Oignons et poireaux. (Onions and leeks.)

*Rev. hort. suisse*, 1950, 23: 65-8.

In a discussion of the differentiation between onion and leek seed and of the influence of the maternal parent and climate on seed quality, an experiment is mentioned which was carried out in 1949 at the horticultural college of Châtellaine. Leeks planted in September produced just as good inflorescences in the following year as the controls planted in June, and the seed quality was not inferior. It is suggested that an even greater saving of time may be accomplished with triennial onion varieties. The germination capacity of light seed was shown to be only slightly lower than that of heavy grains. Rainfall during flowering was found to have an unfavourable effect on seed quality.

854. D'AMATO, F., AND AVANZI, M. G.  
Reazioni di natura auxinica ed effetti  
rizogeni in *Allium cepa* L. (Reactions of  
an auxin nature and rhizogenous effects in  
the onion.) [English summary 2 pp.]  
*Nuov. G. bot. ital.*, 1948, 56: 161-213, bibl.  
95.

Growth responses and induction of laterals in onion roots subjected to treatment with various organic and inorganic chemicals have been studied. For most of the chemicals used, the threshold values of the different reactions have been established and special attention is drawn to the lowered reactivity shown by onion bulbs treated in the spring as compared with those treated in winter, using 4-5% NaCl, 0-005 p.p.m. 2,4-D and 0-01% colchicine. The macroscopical effects are described but no relation has been found between the degree of growth and the intensity of lateral root formation. Differentiated cells were stimulated to divide by decapitation of roots, most of the cells in the cortex and central cylinder showing mitosis with diplochromosomes. These stimulated cells were typically colchicized by  $\frac{1}{2}$  saturated solution of "Tiogamma", a commercial product containing "666" which had been found to induce c-mitotic cycles in germinating meristems. A special study of the cytology of the reaction of onion roots to 2,4-D and its sodium salt has been made. The macroscopic effects are well illustrated and observations of the frequency of mitoses with diplochromosomes in both cortex and central cylinder as far as 22 mm. from the root cap leads to the conclusion that "growth substances" do not induce mitoses with diplochromosomes but stimulate old nuclei with diplochromosomes to divide. The diplochromosomes show aberrations during mitosis which do not occur in the divisions of diploid nuclei and they are not able to undergo more than one mitosis. The cytological situation in the various tissue layers of a differentiated onion root is

described and it is suggested that double chromosome reproduction in the resting stage precedes, rather than follows, tissue differentiation. Decapitation shows an antagonistic action to the stimulating effect of sodium 2,4-D. Observations on the cytohistological effects of colchicine agreed with the work of previous workers. C-mitosis has been maintained for twenty-two days under favourable conditions giving cells with not less than 2,000 chromosomes. The cytology of the differentiated tissues has been investigated and the importance of cytohistological analysis in investigating problems of plant organogenesis is pointed out.

M.E.S.

855. ADAMS, A. F. R.  
Copper deficiency of onions grown on peat.  
I. Preliminary report.

*N.Z. J. Sci. Tech., Sect. A*, 1948, 30: 105-9, bibl. 17, illus.

In a copper deficiency disorder of vegetables, particularly onions, grown on an acid peat soil near Christchurch, a significant response to a foliar copper sulphate spray was obtained. Affected plants show slight chlorotic mottling with loss of turgor from the tip downwards; the leaves later bend back, wither, and die back. Bulbs develop poorly, most of them failing to mature, many finally withering and the root-system is weak.—Canterbury Agricultural Coll., N.Z.

856. BURKHOLDER, W. H.  
Sour skin, a bacterial rot.

*Phytopathology*, 1950, 40: 115-17.

A disease of onions known among growers as "sour skin" or "slippery skin" is a rot that attacks only certain of the outer fleshy scales of the bulb, although not necessarily the outermost scale. The causal organism, *Pseudomonas cepacia* n.sp., is described.—Cornell Univ., N.Y.

857. KREUTZER, W. A., AND MONTAGNE, J. T. W.  
Chlorobromopropene, a potential fungicidal  
soil fumigant.

Abstr. in *Phytopathology*, 1950, 40: 16.

An application by injection of 25 gal. per acre 3 weeks before planting gave economic control of pink root of onions (*Pyrenochaeta terrestris*). The yield of onions from treated plots was approximately four times that from control plots.

858. MINISTRY OF AGRICULTURE, LONDON.  
Peas.

*Bull. Minist. Agric. Lond.* 81, 1949, pp. 22, 1s. 3d., illus.

Out of the approximately 257,000 acres cropped to peas in England and Wales in 1948, about 54,000 acres were grown for picking green, 23,000 acres for canning and 180,000 acres for drying. The Bulletin presents concise information on all aspects of pea growing and should therefore be of value to the market gardener as well as to the farmer. One of its outstanding features are the 26 photographic illustrations on 12 pages of art paper. Responsibility for the cultural information rests with the specialist advisers of the N.A.A.S. forming the Vegetable Group under the chairmanship of Mr. F. A. Secrett.



859. VIDALON, C. G., SCHROEDER, R. A., AND ALBRECHT, W. A.

**Carbohydrate-protein ratio of peas in relation to fertilization with potassium, calcium, and nitrogen.**

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 352-7, bibl. 13.

Garden peas were grown in soil containing varying amounts of exchangeable Ca, K and N to determine the effect of these elements on the carbohydrate-protein ratio in the seeds. The balance of these 3 nutrients was clearly the most important controlling factor. While a high level of N increased the proportion of protein, the effect of Ca depended on the N level. In general, high levels of K increased the proportion of carbohydrates, but this effect became less pronounced as the amounts of Ca and N were increased.—*Mo. agric. Exp. Stat.*, Columbia.

860. LEHR, J. J.

**Exploratory pot experiments on sensitiveness of different crops to sodium: A. spinach.**

*Plant and Soil*, 1949, 2: 37-48, bibl. 12.

In order to evaluate the significance of sodium in the nutrition of spinach, sodium nitrate and calcium nitrate fertilizers were compared in pot trials, in which potassium was supplied at different levels. The plants were grown in an artificial, cation-adsorbent medium, dursit, and in sandy humus soil. The data show that spinach has a remarkable ability to take up sodium, which can replace potassium to a certain extent, though the latter element is preferred where both nutrients are available in sufficient quantity. However, even in the presence of adequate potassium supplies, sodium was found to improve yield and quality. The reduction of potassium requirements in spinach by applications of sodium nitrate is of economic importance.

861. SMITH, P. G.

**Downy mildew immunity in spinach.**

*Phytopathology*, 1950, 40: 65-8.

All commercial varieties of spinach tested were highly susceptible to downy mildew (*Peronospora spinaciae*). Immunity was found in two uncultivated varieties. By hybridization it was shown that immunity is inherited as a single dominant gene.—*Univ. California*.

862. JUHRÉN, M. C., AND WENT, F. W.

**Growth in darkness of squash plants fed with sucrose.**

*Amer. J. Bot.*, 1949, 36: 552-9, bibl. 2, illus.

"Squash plants (*Cucurbito pepo*) placed in darkness do not grow more than a few millimetres and die within 4-5 days. When their hollow petioles are injected with a 7% sucrose solution, they not only remain alive in darkness for periods of at most 30 days, but their stems also elongate at a rate of maximally 50 mm. per day. The maximum growth rate is reached about 1 week after placing the plants in darkness." The relative effectiveness of levulose, dextrose and sucrose was determined. While all factors necessary for stem and petiole elongation and for leaf initiation and primordial leaf development were shown to be present in plants fed with sugar in darkness, factors required for further leaf growth seemed to be totally absent. Leaves did not enlarge beyond about 10 mm.

Injecting adenine and other nucleic acids, and amino acids failed to cause any further enlargement. Further expansion, to a very limited degree, was only obtained by exposing the etiolated leaf to strong light.—*Calif. Inst. Technology, Pasadena*.

863. HASKELL, G.

**Studies with sweet corn. 1. Cold treatment and germination.**

*Plant and Soil*, 1949, 2: 49-57, bibl. 8.

It is shown that "cold hardy lines of sweet corn may be selected by delaying emergence at low temperature to allow pre-emergence killing off".—*John Innes Horticultural Institution, Merton*.

864. BERGER, K. C., AND TRUOG, E.

**Response of sweet corn to fertilization with copper and zinc.**

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 372-3, bibl. 5.

The inclusion of 5 and 10 lb. of copper sulphate increased the yield of useable ears [i.e. suitable for canning] significantly in all the experiments on Miami silt loam, the increases ranging from 5% to 40% over that of 3-18-9 fertilizer without copper. Zinc sulphate also increased the yield of useable ears significantly in 3 of the 5 experiments on Miami silt loam, the increases ranging from 10% to 45%. Increases in yield with copper or zinc were not obtained on the Carrington silt loam, a Prairie soil high in organic matter. [From authors' summary.]—*University of Wisconsin, Madison*.

865. CARNCROSS, J. W. [Editor].

**American tomato yearbook.**

*Pamphl. Rutgers Univ. New Brunswick, N.J.*, 1949, pp. 40.

This bulletin affords information on food value of the tomato, on production areas in the U.S.A., on relevant U.S. literature, Associations, varietal importance, prices, Canadian production, export of tomatoes and tomato products from U.S.A. and on firms providing equipment.

866. NEL, E. A.

**The Durbot tomato variety.**

*Fmg S. Afr.*, 1949, 24: 473-4, bibl. 4, illus.

An account is given of the development and commercial qualities of a new tomato variety, "Durbot". Tests made at the Durban Botanical Station showed this variety to be highly resistant to *Fusarium* wilt, a disease that is very serious in the Transvaal lowveld. The seed, however, does not yet breed true to type, and further selection is necessary.

867. LUCHINI, R.

La critica situazione della industria del pomodoro nel Sud-Mendocino creata dalla scarsità della materia prima. (The tomato industry in South Mendoza Province, Argentina, threatened by lack of raw material.) *Riv. Agric. subtrop.*, 1949, 43: 160-82.

This article is chiefly interesting for the account given of methods of tomato growing in South Mendoza. The plants are grown on a ridge and furrow system without staking, the furrows being used for irrigation. The expenses involved are detailed and they show an extremely small margin of profit. In comparison a

very much more mechanized system of growing adopted by one of the big processing firms is detailed and the steps and costs involved are also given.

868. JUILLET, A.

Traitements des tomates par les hormones parthénocarpiques. (Treatment of tomatoes with parthenocarp-inducing growth substances.)

*Phytoma*, 1949, 2: 8: 5-11, bibl. 8.

A series of experiments was carried out over a period of 2 years to determine the value of parthenocarp-inducing hormones for outdoor tomato crops grown in the Beaucaire market gardening region of France. The tomato variety Ronde lisse de Perpignan was used, and the growth substance  $\beta$ -naphthoxyacetic acid applied at various concentrations (100-400 p.p.m.), either alone or reinforced with the triethanolamine salt of 2,4-D. The small amount of parthenocarp induced was notable. In spring and summer crops this did not exceed 15%; in autumn crops, when the weather was less suitable for pollination, the percentage was higher. Strong concentrations of growth substances also increased the number of parthenocarpic fruits, but this was accompanied by an undesirable malformation of fruit and plants. It is therefore concluded that the use of parthenocarp-inducing substances solely for the purpose of producing seedless fruit is not justified with open-air crops. Other striking advantages, however, were recorded. (1) Treated fruit was superior in weight, size and quality to the controls. (2) An increased yield of at least 33% was obtained, and the number of culls was reduced by 10%. (3) The treated crops ripened at least a week earlier than the untreated ones. The optimum dose appeared to be 100 mg.  $\beta$ -naphthoxyacetic acid + 1 mg. triethanolamine salt of 2,4-D per litre.—Station de Recherches du Comptoir Chimique Méridional de Beaucaire (Gard.) [see also *H.A.*, 20: 292].

869. JAKUŠKINA, N. I.

The effect of growth stimulants on the distribution of nutrient substances in plants. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 69: 101-4, bibl.

Experiments were made on tomato plants in pots, spraying them with 2,4-D at the beginning of flowering. Analyses of stems, leaves and fruit later showed that the ash,  $P_2O_5$ , and N contents of treated plants differed from those of untreated plants, e.g. they were higher in the fruit but lower in the leaves.

870. ATKINSON, J. D., AND OTHERS.

Tomato diseases and pests in New Zealand and their control.

*Inform. Ser. D.S.I.R., N.Z.* 2, 1949, pp. 112, illus., 2s. 6d.

The fungous, bacterial, virus, and physiological diseases and insect pests of tomatoes are described with 89 illustrations, and control measures are indicated under cultural practices, plant therapeutants, spraying and fumigating, soil disinfection, and certification of therapeutants. The diseases and pests are classified in a key under: plants wilted, leaf, stem, root, and fruit symptoms, and seedling disease.

871. VASUDEVA, R. S., GARGA, R. P., AND AZAD, R. N.

Necrosis in tomato (*Lycopersicon esculentum* Mill.).

*Curr. Sci.*, 1949, 18: 411-13, bibl. 5, illus.

Tomato plants inoculated with leaf extract of potato plants showing severe crinkling and mottling repeatedly produced veinal necrosis and necrotic spots. The disease from tomatoes was transmitted in turn to healthy tomato plants and several other species of *Solanaceae*. Tests on the different hosts showed that the necrosis was caused by the joint action of *Solanum* viruses 1 and 2.

872. LINN, M. B., AND EMGE, R. G.

Development of anthracnose and secondary rots in stored tomato fruits in relation to field spraying with fungicides.

*Phytopathology*, 1949, 39: 898-96, bibl. 16.

In general, Zerlate alone, tribasic copper sulphate alternating with Zerlate or Fermate, and Dithane D-14 plus zinc sulphate were somewhat superior to other fungicides in controlling tomato anthracnose or ripe-rot (*Colletotrichum phomoides*). Secondary rots in stored tomatoes due to soil-borne bacteria and fungi were worse in sprayed than in unsprayed fruit.—Univ. of Illinois.

873. GALLEGLY, M. E., JR., AND WALKER, J. C.

Plant nutrition in relation to disease development. V. Bacterial wilt of tomato.

*Amer. J. Bot.*, 1949, 36: 613-23, bibl. 13, illus.

The development of the bacterial wilt organism (*Pseudomonas solanacearum* E. F. Sm.) in tomato plants was studied in relation to host nutrition. Plants were grown in constant drip sand cultures, with varying concentrations (0.1 H-3 H) of the basal salt solution (Hoagland and Snyder, 1933), and in unbalanced solutions. During summer months disease development was greatest at 0.1 H and decreased with an increase in salt concentration; during early spring and late autumn disease development increased with an increase in salt concentration up to 0.5 H and 1 H, but decreased sharply with further increase in nutrient concentration. During summer the winter-type results were reproduced when day-length was maintained at 12 hours, while the summer-type results were reproduced at an 18-hour day-length. Variation in light intensity and sand temperature failed to alter the long-day disease curve. During the summer disease development in the unbalanced solutions was increased at the low K level and decreased at the high N level as compared with that in the basal solution. During early spring disease development was lower at both high N and low N levels, but in the low K solution it was not different from that in the basal. Disease development in the unbalanced solutions at 32° C. and temperature was decreased at the high N level and increased at the low N level, while at 24° C. sand temperature the reverse was true. Thus the winter-type results in the unbalanced N solutions were reproduced at 24° C., while the summer-type results were reproduced at 32° C. The two sand temperatures had no effect on disease development in the low K solutions. At low light intensity disease development was reduced in the low K solution. There were indications that



low pH salt solution reduced disease development.—University of Wisconsin, Madison.

874. GALLEGLY, M. E., JR., AND WALKER, J. C.  
Relation of environmental factors to bacterial wilt of tomato.

*Phytopathology*, 1949, 39: 936-46, bibl. 4.

Results were obtained showing the effect of post- and pre-inoculation factors on development of bacterial wilt of young tomato plants (*Pseudomonas solanacearum*). Post-inoculation showed that the disease increased with an increase of soil temperature and with an increase in air temperature up to 36° and 28° C. respectively. Pre-inoculation environmental factors were not so effective.—Univ. of Wisconsin.

875. KELMAN, A.

Influence of nitrogen nutrition on the development of bacterial wilt in tomato and tobacco.

Abstr. in *Phytopathology*, 1950, 40: 14.

High levels of nitrogen above the optimum for growth significantly depressed wilt development.

876. SAMSON, R. W.

Severe gray leafspot on mid-western tomatoes.

*Plant Dis. Repr.*, 1949, 33: 387-9.

During the first three weeks of August 1949, grey leaf spot (*Stemphylium solani*) was severe in many canning tomato fields in Indiana. A planting of the Ontario variety was almost completely defoliated. The factors associated with severe outbreaks are enumerated.—Purdue, Univ. agric. Exp. Stat., La Fayette, Indiana.

877. JACKS, H.

Soil disinfection. VII. Comparative value of formaldehyde and of paraformaldehyde in the control of verticillium-wilt. VIII. Chemical control of verticillium-wilt of tomatoes. *N.Z. J. Sci. Tech., Sect. A*, 1948, 30: 115-18, 118-23, bibl. 4.

Formaldehyde at 0.8% and over, and paraformaldehyde at 1.6% gave satisfactory control. Chloropicrin and formalin gave satisfactory control both in potting soil and in glasshouses. Carbon disulphide, D-D, and Iscobromes I and II applied as emulsions to soil in boxes, gave better control than application of concentrated fumigants to soil held in gastight containers.—D.S.I.R., Auckland.

878. JACKS, H.

Soil disinfection. IX. Control of eelworm in outdoor soil.

*N.Z. J. Sci. Tech., Sect. A*, 1948, 30: 123-6, bibl. 4, illus.

In an experiment on the control of eelworm (*Heterodera marioni*), in outdoor soil which in the previous year had carried a crop of tomatoes heavily infested with the eelworm, chloropicrin and D-D applied at the rate of 3 ml. per sq. ft. gave almost complete control, while Iscobrome II, at the same rate, markedly reduced infestation.—D.S.I.R., Auckland.

879. HOWARD, H. W., AND LYON, A. G.

The identification and distribution of the British watercress species.

Reprinted from *Watsonia*, 1950, 1: 228-33, bibl. 11, illus.

Watercress, formerly regarded as being a single species,

is now known to be represented in Britain by 2 distinct species, *Nasturtium officinale* R. Br. and *N. microphyllum* Boenn. ex Rchb., and their hybrid [see H.A., 16: 913]. In this paper the distinguishing characters of the 3 types are detailed, and provisional lists of records concerning their distribution are presented.—School of Agriculture, Cambridge.

880. HOWARD, H. W., AND LYON, A. G.

"Crook root" of watercress.

Reprinted from *Nat. Fmrs' Union Watercress Branch News Sheet*, 1950, 12: 49: 7-8.

The few facts that are known about the serious "crook root" disease of watercress, caused by a species of the *Spongospora* fungus, lead the authors to put forward the following theory: "that the severity of the disease depends upon the difference between the rate of growth of the cress and the speed at which the crop roots become infected". They therefore suggest that anything that can be done to increase the rate of growth of the plants, by good cultivation, skilful control of water level, use of good stocks, etc., will keep the disease in check and enable saleable crops to be produced in February instead of in April or May. In addition, other practices are suggested that will enable growers to minimize their losses from this disease. These include strict hygiene to prevent introduction of the disease, the production of green cress from seed, careful levelling of the beds to produce a shallow current, and lowering the water level of badly infected beds to encourage new rooting.—School of Agriculture, Cambridge.

### Mushrooms.

881. (GAHM, O. E.)

Mushrooms mechanized to cut cost.

*Grower*, 1949, 32: 1073-4.

A report of a talk on methods of mushroom growing practised in America. Farms are usually large units and highly mechanized, but yields are comparatively low, averaging from 1½ to 2 lb. per sq. ft. Peak heating is a standard practice.

882. KESSLER, J. L.

Mushroom trays save space and manure.

*Grower*, 1950, 33: 64-9, illus.

A Sussex grower gives an account of his experiences of the tray system of mushroom growing, describes the layout of his installation, and lists the advantages and disadvantages of the system that he has found in practice.

883. BRILL, J. E.

De moeilijkheden bij de afzet van champignons. (The difficulties in marketing mushrooms.)

*Meded. Dir. Tuinb.*, 1950, 13: 68-76.

The situation of mushroom growing in Holland is described, particularly in relation to the two chief mushroom growing districts, in south Limburg and around Venlo. The difficulties to-day in the sale of mushrooms are chiefly a result of the low demand, for, in comparison with many other countries, the consumption of mushrooms in Holland is very low. To get over the difficulties the price must be kept low, propaganda methods must be practised, and marketing must

be centralized. The use of pure and disease-free strains is advised.

884. ANON.

**"Red Geotrichum" a new invader of mushroom beds.**

*Mushroom News* (W. Darlington & Sons Ltd., Worthing, Sussex), 1949, 2: 1: 12-13; 2: 2: 20-1, from abstr. in *Rev. appl. Mycol.*, 1949, 28: 616.

Infestation of mushroom beds by a new fungus known to growers as "red Geotrichum" but assigned by the Commonwealth Mycological Institute to the genus *Sporendonema*, is described. The fungus produces dense white cottony mycelium which later turns deep pink. Temperatures exceeding 70° F. should be avoided and affected beds should not receive lime.

885. MELTZER, J., AND URI, J.

Bestrijdingsproeven met Bentox en andere HCH-paraferaten tegen de champignonvlieg (*Sciara spec.*) in de grotten van de St. Pietersberg. (Experiments with Bentox and other HCH insecticides against the mushroom fly (*Sciara sp.*) in the St. Pietersberg caves.) [With English translation.] *Tijdschr. PlZiekt.*, 1949, 55: 279-89.

An account of trials in the St. Pietersberg caves and in a shed at St. Pieter-Maastricht, Holland, in 1948. Treatment of the manure is useless, since neither the larvae nor imagoes of *Sciara* live in it. One dusting of the beds with 3% Bentox (dolomite marl with 3% HCH isomer mixture) at a rate of 25 g./10-12 m<sup>2</sup>, or Bentox 1% 25 g./110-12 m<sup>2</sup>, or 0.1%  $\gamma$ -isomer of HCH prevents infestation by the mushroom fly. Infested beds can be freed from infestation by dusting a few times with 3% Bentox. Quality, smell, and taste of the treated mushrooms are unaffected.

**Potatoes.**

(See also 525, 722, 724, 760, 926.)

886. CAMPBELL, J. C. [Editor].

**American potato yearbook.**

*Pamphl. Rutgers Univ. New Brunswick, N.J.*, 1949, pp. 40.

This bulletin is crammed with factual information of interest to those concerned in every branch of potato production, marketing and processing. It concerns publications, regulations, varietal importance, utilization, world acreages, acreages in U.S.A. devoted to seed production and names of merchants providing equipment.

887. STEVENSON, F. J.

**Old and new potato varieties.**

*Amer. Potato J.*, 1949, 26: 395-404.

A note of the relative production and region of production of 20 "old" and 31 "new" potato varieties in the U.S.A. is followed by a discussion of the points of interest in many individual varieties.

888. HOWARD, H. W.

**Potato grafting experiments. I. The effect of grafting scions of Epicure on the short-day species *Solanum demissum*.**

*J. Genet.*, 1949 (issued 1950), 49: 235-41, bibl. 9, illus.

The Russian scientist Filippov claims to have produced true "vegetative hybrids" by grafting the short-day species of potato, *Solanum demissum* and *S. acaule*, with scions of the early, cultivated varieties of *S. tuberosum*, Early Rose and Epicure [see *Pl. Breeding Abstr.*, 9: 769 and 13: 1276]. Experiments were conducted at the School of Agriculture, Cambridge, during 1946-48 to investigate this claim. Plants of *S. demissum* were grown under long-day conditions, and the effect of grafting with scions of the variety Epicure, which sets a good yield of tubers under long-day conditions, was studied. Grafted plants produced tubers much earlier than those not grafted; moreover, they did not produce stolons that appeared above the ground as leafy shoots, a characteristic of *S. demissum*. These results are explained on the grounds that the underground portions are influenced by the photoperiodic reaction of the tops. Plants grafted a second year with Epicure produced a much higher yield of tubers than those grafted for 1 year only; the reason for this is not understood. Tubers of plants grafted the previous year germinated more quickly, flowered earlier and matured earlier than tubers of plants not grafted the previous year. They did not, however, have a higher yield. These results are thought to be due to the conditioning of the tubers in the previous year by the tops, which matured earlier and better than those of the ungrafted plants. No graft hybrids were found. Thus, although many of Filippov's results are confirmed in these experiments, it is shown that they may be accounted for on physiological grounds, and they do not appear to justify his claim to have produced a graft hybrid. It is intended to continue the work.

889. SCRIVEN, W. A., AND POOLE, C. M.

**Mechanized potato planting.**

*Agriculture, Lond.*, 1950, 56: 573-6, illus.

Problems that arise from the use of mechanical planters are discussed, and a number of useful suggestions made for overcoming difficulties. The article should be of interest to manufacturers of machinery as well as to farmers.

890. HOWE, O. W., AND RHOADES, H. F.

**Interrelations of moisture, plant population, and fertility on the production of Red Triumph potatoes in Western Nebraska.**

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 539-44, bibl. 7.

This study of the interaction of environmental factors on the yield and quality of potatoes was made at the Scotts Bluff Field Station, Mitchell, Nebraska, on very fine sandy loam. The split plot technique was used. A high moisture level significantly increased the yield of potatoes, the maximum effect being obtained in plots with the closest row spacing and the highest fertility level, i.e. receiving 120 lb. N and 200 lb. P<sub>2</sub>O<sub>5</sub> per acre. Close spacing also increased the yield, especially at high moisture levels. As the fertility of the soil was originally high, application of commercial fertilizers only increased yields in plots with the highest moisture levels and closest spacing. The percentage of scab and irregularly shaped potatoes increased with a decrease in moisture level.—Nebraska agric. Exp. Stat., Lincoln.



## 891. VAN SCHREVEN, D. A.

Over ontijdige knolvorming bij vroege aardappels. (**Premature tuber formation in early potatoes.**) [English summary 1½ pp.] *Tijdschr. Plziekt.*, 1949, 55: 290-308, bibl. 14, illus.

When potato tubers are allowed to absorb water during sprouting in a dark room at  $\pm 20^{\circ}\text{C}$ . the shoots develop small tubers. The development of these tubers is delayed by a culture solution containing all the necessary elements, but the number of tubers is increased by such a solution.

## 892. MÜNSTER, J.

Détermination de la force germinative du tubercule de pomme de terre. (**The determination of the germinating power of the potato tuber.**) [German summary 3½ pp.] *Landw. Jb. Schweiz*, 1949, 63: 905-87, bibl. 121.

The investigations here described were aimed at deciding whether it is possible to determine the germinating power of seed potatoes; and, if so, if it is affected by altitude and tuber size and bears any relation to yield. The following method was employed: Each tuber was put into a clay vessel (9 cm. deep, 22 cm. diameter) filled with pure sand up to 2-4 cm. below the rim, being placed on top and embedded in a layer of quartz sand to stop root development. A drainage pipe of 20 cm. diameter was then placed over the vessel and filled with a 20 cm. layer of quartz sand. Thus, all sprouts had to overcome the same pressure. The test was broken off as soon as the first germ of a series reached the surface of the quartz layer, on the average after 31 days. The conclusions drawn from the results include the following: (1) The number of sprouts per tuber increased with tuber weight, irrespective of altitude. (2) The total length of sprouts is largely determined by the number of sprouts per tuber. (3) The average sprout diameter increases with tuber weight. (4) Total weight of sprouts is related to their total length and may therefore be used alternatively as an indicator of germinating power.—It was not possible to find a simple correlation between germinating power and yield, since the latter is affected by too many factors. Neither did the author succeed in establishing a relationship between germinating power and (a) non-protein nitrogen, (b) respiration intensity during storage.

## 893. WRIGHT, R. C., AND WHITEMAN, T. M.

The comparative length of dormant periods of 35 varieties of potatoes at different storage temperatures.

*Amer. Potato J.*, 1949, 26: 330-5.

The tabulated data indicate that while there are wide varietal differences the usable life of potato stocks kept at  $50^{\circ}\text{F}$ . is longer than has been realized. It can be further lengthened by the use of sprout inhibitors early in the storage period.

## 894. PATISSIER, J.

Observations sur l'influence du froid et de la germination préalable sur la conservation, la végétation et le rendement des plants de pommes de terres. (**The effect of cold and of previous sprouting on condition in storage, growth of plants and yield of potatoes.**) *C.R. Acad. Agric. Fr.*, 1949, 35: 626-9.

Cold storage of seed tubers (January to March) resulted in less loss of weight of the tubers, and better growth and increased yield of the plants. Sprouting the tubers before planting also increased yield—by 27% from the cold-stored tubers and 20% from those in ordinary storage.

## 895. BETZEMA, J., VAN GEEL, J. D. W., AND MELTZER, J.

Verhinderen van spruitvorming bij poot-aardappelen tijdens de bewaring. (**Checking the sprouting of seed potatoes during storage.**) [English summary 9 lines.] *Meded. Dir. Tuinb.*, 1950, 13: 91-5.

Sprouting of Eersteling seed potatoes was inhibited by spraying the crop with a special growth substance [composition not given] at various times during the growing season of 1948. During storage in the winter of 1948-49 the treated potatoes did not sprout, whereas the untreated ones showed long sprouts. The treated seed potatoes were planted the next year and produced a crop not appreciably different from that of the untreated seed tubers.

## 896. WURGLER, W.

Inhibition des germes de pommes de terre par des substances de croissance. (**The control of sprouting in potatoes by growth substances.**) *Rev. romande Agric. Vitic.*, 1950, 23: 2-8, bibl. 8.

Graphs, photographs and tabulated data illustrate the author's results, confirming earlier findings by other workers, that  $\alpha$ -naphthaleneacetic acid stimulates sprouting of potatoes at low concentrations (0.0001-0.001%) and checks it at higher concentrations (0.1%). An examination of the sprouts 40 days after treatment (immersion for 5 minutes in 0.1% hormone solution) showed: (1) that 4 mm. from the top they contained plenty of small starch grains in the pith and rind, whilst the controls (immersion in water only) contained few, the starch grains 5 mm. from the base being large and plentiful in both cases; (2) that reducing sugars were practically absent at the top but present at the base, and that the aldehyde reaction was negative. In the controls the reducing sugar content near the top was high and the aldehyde reaction in that region was positive.

## 897. EDWARDS, G. R.

Prevention of sprouting and loss of weight in stored potatoes.

*J. Dep. Agric. S. Aust.*, 1949, 53: 49-57.

The results of two trials have shown that, with correct usage, the treatment of stored potatoes to suppress sprouting and loss of weight can be of commercial value. The best time of application is towards the end of the rest period just prior to sprouting, but treatment at any time between harvest and sprouting will be successful.

## 898. DAVIS, G. B.

Quality loss in marketing Oregon early-crop potatoes. *Stat. Bull. Ore. agric. Exp. Stat.* 468, 1949, pp. 32, illus.

This study is one of a series of investigations dealing

with the changes in quality of Oregon potatoes occurring between the producer and the consumer. The results show that the quality of Oregon's early crop potatoes can be improved by (1) an increase in maturity, (2) a reduction of mechanical injuries, and (3) a decrease in the amount of decay. Factors affecting these three aspects of improvement are discussed. Decay is a major problem, and studies show that exposure of immature tubers to summer weather, especially wind, lessens their resistance to decay.

899. PORUCKI, G. V.

**The dependence of tuber development in the potato on the stimulation and nutrition of the eyes.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 68: 961-4, bibl. 19.

The author reviews previous work on the physiological and chemical differences of the apical and basal parts of potato tubers, and then describes experiments to investigate the dependence of tuber development on the composition of the mother tuber and on the differential reaction of the eyes of the apical and basal ends of tubers, by vegetative hybridization (grafting) with various combinations of eyes and half tubers of two named varieties. From the data obtained it is concluded that the alteration in nutrition of the "sett" affects the intensity of tuber formation in the hybrid plants.

900. DUNN, L. E., AND ROST, C. O.

**Effect of fertilizers on the composition of potatoes grown in the Red River Valley of Minnesota.**

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 374-9, bibl. 17.

In this study of the effect of phosphate and potash fertilizers on the composition of potatoes grown in various parts of the Red River Valley it was found that distinct differences in composition occurred in crops grown in different fields of the same soil type. Fertilizer treatments also affected the phosphate and potash content of the crop, particularly when it was grown on nutrient deficient soils. Potash fertilizers containing chlorides lowered the dry matter content and increased the chlorine content of the potatoes to a marked extent. The fertilizers tended to lower the protein content of the crop. The percentages of calcium, magnesium, and sulphur remained quite uniform, regardless of fertilizer treatment. Values are given for the amounts of nutrients absorbed by an acre (250 bushels) of potatoes. —Minn. agric. Exp. Stat., St. Paul.

901. SMITH, O.

**Recent fertilizer and cultural investigations with the potato.**

*Amer. Potato J.*, 1949, 26: 361-78, bibl. 71.

Most of the literature discussed appeared in 1948. It covers the effects of N, P and K fertilizers, plant tissue testing, lignin as a fertilizer, hormone treatment, weed control, killing off the vines, retardation of sprout growth by growth substances, also chemical composition of the plant, vitamin C in potatoes, and potato quality.

902. COOKE, G. W.

**Methods of applying fertilizer to potatoes planted by machines.**

*Agriculture, Lond.*, 1950, 56: 571-3, bibl. 1.

The fertilizer placement experiments summarized here have been described in more detail elsewhere (H.A., 19: 3207 and 3208). Considered from the standpoint of mechanized planting the results indicate the following: (1) Where machines with no fertilizer attachment are used, broadcasting on the flat is the only course possible; this makes inefficient use of the fertilizer, and heavier dressings are needed to secure yields comparable to those obtained when fertilizer is spread on ridges before hand planting. (2) Planting machines with fertilizer attachments allow better use to be made of the fertilizer, especially when placed in bands 2 inches to the side and a little below the sets as is commonly done in the U.S.A. (3) With machines placing fertilizer directly on the rows of sets good results are obtained with light dressings, but above about 10 cwt. per acre there is risk of damage to sprouting.

903. MULDER, E. G.

**Mineral nutrition in relation to the biochemistry and physiology of potatoes. I. Effect of nitrogen, phosphate, potassium, magnesium and copper nutrition on the tyrosine content and tyrosinase activity with particular reference to blackening of the tubers.**

*Plant and Soil*, 1949, 2: 59-121, bibl. 42.

It is shown that the bluish-black discolorations found in raw potassium-deficient potato tubers are due to the enzymatic oxidation of tyrosine and *o*-dihydric phenols to melanin. Two factors are responsible for the extreme tendency of potassium-deficient tubers to blacken, viz. the high content of free tyrosine and the liability of the cells to sustain injury. The blackening of potato tubers after cooking is shown to be due to melanin only in those cases in which black or red oxidation products of tyrosine or *o*-diphenols were formed before the boiling. Potassium-deficient tissues uncoloured before cooking, although very liable to bruise and high in tyrosine did not give rise to melanin formation either during or after cooking. The bluish-green pigment which developed in such tissues after cooking and exposure to the air, was found to be due to the oxidation of a ferrous compound of *o*-dihydric phenols to the corresponding ferric compound. An extensive study was made of the occurrence of free tyrosine in potato tubers having differing supplies of either potassium, nitrogen, phosphate, magnesium or copper. Potassium deficiency brought about a very high content of this amino acid. Magnesium deficiency gave a similar but much smaller increase. The tyrosinase activity of potato tissues was shown to be independent of the potassium, phosphate and magnesium nutrition of the plants. Nitrogen-deficient tubers had a somewhat lower tyrosinase activity, probably owing to the much lower protein content. Potatoes grown on soils poor in copper showed a tyrosinase activity less than one-tenth of that of tubers supplied normally with this element. As a result of the low tyrosinase activity, blackening of bruised tubers deficient in both potassium and copper was slight in comparison with those deficient in potassium but supplied normally with copper. [From author's summary.]—Agric. exp. Stat. and Inst. Soil Res., T.N.O. Groningen.



904. TERMAN, G. L.  
Green manure crops and rotations for  
Maine potato soils.  
*Bull. Me agric. Exp. Stat.* 474, 1949,  
pp. 40, bibl. 8, illus.

Recommendations are made concerning the green manuring and cropping of Maine potato soils, as a result of extensive experiments conducted by the Maine Agricultural Experiment Station from 1931 to 1948. Results show that Japanese millet is usually the most satisfactory non-legume green manure crop from the standpoints of high yield, weed control and ease of incorporating the organic matter with the soil. The organic matter content of Caribou loam was increased much more by the addition of 6 tons of straw or 20 tons of stable manure per acre than by green manuring. There was no apparent difference between the tilth of level loam soils (Class I land as classified by the U.S. Conservation Service) cropped continuously to potatoes for 22 years and the soil on adjacent plots cropped in a 2-year rotation of potatoes and green manure over the same period. Such land may therefore be used for intensive potato production.

905. KARVATA, S.  
Physiological studies on virus disease in  
potato. [Japanese.]  
*J. hort. Ass. Japan*, 1947, 16: 137-50, bibl.  
37 [received 1950].

A spring maturing potato variety sprouts earlier and has feeble shoots than an autumn variety and its polarity is less marked. In height and vigour a spring variety is not markedly different from an autumn one but it withers quickly and the crop is small. Its rate of virus development is high. Light, gravity and synthetic growth substances had no obvious differential effect on the development of virus disease in the two types. It is uncertain that maturity can be prevented by the use of growth substances, though there is some promise in this direction.

906. ROLAND, G.  
Étude de la transmission du virus X  
(*Solanum virus I*, Orton) à la descendance  
végétative chez la pomme de terre. (The  
transmission of potato virus X to the tubers.)  
[German summary 4 lines.]  
*Parasitica*, 1949, 5: 105-9.

The tubers of potato plants infected with virus X are not necessarily infected with the virus; often some of them, sometimes many, escape infection.—Stat. Phytopath. Gembloux, Belgium.

907. DE MONTGRÉMIER, H. A.  
La dissémination du virus X (*Marmor  
dubium*, Orton Holmes) dans les cultures de  
pommes de terre. Étude sur le rôle du  
sectionnement des tubercules. (The dis-  
semination of virus X in the potato. A  
study of the part played by cutting seed  
tubers.)  
*C.R. Acad. Agric. Fr.*, 1949, 35: 595-7.

Previous work in America and England is reviewed. From her own experiments the author concludes that the transmission of virus X by cutting the seed tubers is very rare.

908. GONZENBACH, C.  
A biologic method for testing chemicals for  
the control of the potato ring-rot pathogen.  
Abstr. in *Phytopathology*, 1950, 40: 10.

The method consists in treating ring rot (*Corynebacterium sepedonicum*) contaminated toothpicks with aqueous solutions of known and suspected bactericidal substances and introducing the toothpick into tomato plants. Inoculations made in young plants near the growing point proved most reliable.

909. LANE, G. H.  
Disinfection of a new stationary-type seed-  
potato cutter to control the spread of ring  
rot.

*Amer. Potato J.*, 1949, 26: 379-84, bibl. 4.

A new blade is described. Both calcium hypochloride and mercuric chloride proved effective as disinfectants against ring rot.

910. KOLE, A. P.  
Over de invloed van Fusarex op een  
aantastend door poederschurft (*Spongospora  
subterranea* (Wall.) Lagerheim). (The effect  
of Fusarex on powdery scab of potato.)  
[English summary 3 lines.]

*Tijdschr. PlZiekt.*, 1949, 55: 308-11, bibl. 5.

Seed potatoes, heavily infected by powdery scab, were treated with Fusarex before winter storage. The progeny of these potatoes was more infected than that of untreated potatoes.

911. RAUCOURT, M., LANSADE, M., AND VEN-  
TURA, E.  
Essais de traitement du mildiou de la  
pomme de terre (*Phytophthora infestans*  
Mont. de Bary) en 1948. (Trials on the  
control of potato blight in 1948.)  
*Parasitica*, 1949, 5: 89-104, bibl. 8.

Of a number of preparations tested 2% bordeaux mixture gave the best control.—Inst. nat. Rech. agron., Versailles.

912. CALLBECK, L. C.  
Potato vine killing in Prince Edward Island.  
*Amer. Potato J.*, 1949, 26: 409-19, bibl. 14.

Observations and trials in Prince Edward Island and elsewhere give the following indications: The addition of waste crank case oil accelerates the killing of potato vines by sodium arsenite. A British product Lotem-cide, used at 10% strength, gave a quick complete destruction. The killing of the vines may cause discoloration in the tubers: the factors affecting this are probably rapidity of kill, type of chemical, season, age of plants. Tubers from untreated, cut vines showed more stem-end browning than those from untreated check plants or plants killed by slower-acting chemical vine killers. Dinitro compounds in particular have a tendency to induce vascular discoloration in tubers. The moisture content of the plants may affect discoloration. Two seasons' trials indicate that discoloration resulting from the use of dinitro or secondary butyl phenol compounds increases with the age of the plants.

913. TURNER, N., AND WOODRUFF, N.  
Effect of formulations of DDT, and of  
chlordan on potato flea beetles and yield.  
*J. econ. Ent.*, 1949, 42: 470-3, bibl. 13.

Plot and field trials at the Connecticut Agricultural Experiment Station, New Haven, demonstrated that DDT emulsions were less effective in controlling flea beetle on potatoes than spray powders. In field trials spray powders resulted in a significantly higher yield. Chlordan spray powder gave less good control of flea beetle than DDT, but nevertheless resulted in higher yields, which suggests that it is less injurious to the potato plant.

914. PEPPER, B. B., REED, J. P., AND CAMPBELL, J. C.

**Investigations on wireworm control with organic insecticides in New Jersey.**

*Amer. Potato J.*, 1949, 26: 315-25, bibl. 4.

Benzene hexachloride, chlordan and parathion by reason of effect on flavour or high cost proved unsuitable for wireworm control in New Jersey trials. Ethylene dibromide can be used, but better methods of application are essential.

915. LEAR, B.

**Efficacy of dichlorobutene as a soil fumigant against *Heterodera rostochiensis* Wollenweber and *Heterodera marioni* (Cornu) Goodey.**

*Abstr. in Phytopathology*, 1950, 40: 17.

In field plots, injections of 3·2 ml. made 4 in. deep on 10 in. centres reduced the viable nematode population 91% and increased yields of Green Mountain potatoes 11·7 times. Gall counts on roots of squash plants also showed good results from treatments.

916. GÜNTART, E.

**Lutte contre les vers blancs et les vers fil de fer en agriculture. (The control of white grub and wireworm in agriculture.)**

*Rev. hort. suisse*, 1950, 23: 61-5, 90-4, illus.

The wide range of pasture and agricultural crops, on which these trials were carried out in various parts of Switzerland, included vegetables, strawberries and potatoes. The results show that the chlordan products Octaterr and Octamul—the latter for liquid application—control white grub and wireworm as effectively as the hexabenzene chloride preparation, Hexaterr, and do not cause an off-flavour in carrot, lettuce, dwarf beans, dwarf peas, etc. Although the off-flavour in potatoes is only slight in the comparatively few cases when it occurs at all, the recommendation is that no crop should be grown in soil recently treated with chlordan. The data presented specify the amount of insecticide applied and the percentage control achieved.

### *Tobacco.*

(See also 530, 722, 1199.)

917. NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION.

**Special tobacco issue.**

*Res. and Fmg.*, July 1949, Vol. 8, pp. 35.

This special issue of *Research and Farming* is a progress report for growers on the tobacco research work carried out at the North Carolina Experiment Station and its 8 field stations since 1945. It contains articles by various authors on manurial treatments, new weed-killers, pest and disease control, the use of hybrid tobacco, chemical control of sucker development,

prevention of summer erosion, the design of curing barns, priming of Burley tobacco and other subjects. Most of the work has already been reported in the annual reports of the Research Station.

918. TULLOCH, J. B.

**Tobacco growing in Western Australia.**

*Res. Rep. geog. Lab. Univ. W. Aust.* 3, 1949, pp. 14, illus.

Tobacco has only been grown on a commercial scale in Western Australia since about 1930. The industry is confined almost entirely to the Manjimup district, and even there the climatic conditions are far from ideal. The rainfall is moderate, but not evenly distributed throughout the year; the 3 months preceding and during harvest are hot, dry and sunny; dry winds may occur during the day, and sharp falls of temperature at night. Thus the tobacco grower in this district has to use great care in selecting a site and in the cultivation of his crop to compete on the Australian market. The greatest demand in Australia now is for a leaf of bright colour, fine texture and mild smoking quality. Several varieties were tested at Manjimup, and Hickory Pryor, Cash and Holly proved most satisfactory. A variety called Sport is also particularly well adapted to local conditions but the leaf is not so readily accepted by Eastern States manufacturers. An account is here given of methods of production in Western Australia, from the preparation of the land and seedbed management to harvesting, curing, grading and marketing. Annual production figures from 1931 to 1948 are given. The author considers it doubtful whether the industry can compete successfully with imports unless plantings are made on a large scale and mechanized, which weather conditions make impossible.

919. GUTIERREZ, M. E.

**A review of wrapper tobacco experiments and investigations in the Philippines by the Bureau of Plant Industry.**

*Philipp. J. Agric.*, 1949, 14: 95-121, bibl. 27.

In the early stages of the cigar industry the Philippines raised their own wrapper as well as filler tobacco. Subsequently changes in consumers' tastes found local types of wrapper in disfavour and large-scale imports of wrapper leaf had to be undertaken. The author reviews work on the subject that has been done since 1918 and concludes that there is now sufficient information available to encourage the planting of wrapper tobacco. The review touches on acclimatization, variety and cultural tests, regional adaptability trials, and studies into the physiology, morphology, and chemistry of tobacco. Other aspects mentioned are curing, breeding, pests and diseases, production costs and factory utilization.

920. ILJIN, G. S.

**General principles of the synthesis of alkaloids in grafted plants of the genus *Nicotiana*.** [Russian.]

*Biohimija* (Biochemistry), 1949, 14: 552-7, bibl. 19.

Nicotine and nor-nicotine plants, when grafted on tomato, start to lose their alkaloid, but tomato, grafted on those plants, forms nicotine but not nor-nicotine in its aerial parts. Anabasin plants grafted on tomato retain their alkaloid, but tomato grafted on them



acquires alkaloids from the rootstock, i.e. anabasin and nicotine. In inter-specific grafts the production of one or other alkaloid is determined by the property of its own alkaloid, the localization of the mechanism of its production, and the specificity of the enzyme system of the leaves.

921. GREBINSKII, S. O., KIRSANINA, E. F., AND LJUKOVA, L. A.

**Biochemical changes resulting from the grafting of solanaceous plants.** [Russian.] *Biohimija* (Biochemistry), 1950, 15: 42-3, bibl. 5.

The changes in the chemical constituents of the leaves of thorn apple [*Datura*], tobacco, and mahorka [*Nicotiana rustica*] scions grafted on tomato, and the changes in catalase and ascorbic acid content of mahorka and tobacco on tomato, and tomato on mahorka are tabulated. It is concluded that the alteration thus brought about in the metabolism of the scion plants is associated with genetical changes and merits more intensive investigation.

922. GUILLERMO ORTIZ, R.

Un interesante descubrimiento en tabaco.  
(An interesting discovery in tobacco culture.)  
*Agric. trop. Colombia*, 1949, 5: 9: 9-10.

In 1947 D. B. Anderson discovered that sucker development on tobacco plants could be controlled by the application of growth substances to the cut stem immediately after topping [reported in the 70th A.R. N.C. agric. Exp. Stat. for 1947, 1948, pp. 37-8]. The author gives an account of this work and of further experiments carried out during 1948 at the Oxford Experiment Station, N.C., in which he took part. In this case, mineral oil applied to the cut surface of the stem and below it for a distance of 10 cm. gave promising control of sucker development on the variety 402.

923. EREMEEV, G. N.

**A pre-planting method of encouraging rooting in transplanted tobacco and tomato seedlings.** [Russian.]

*Doklady vsesojuz. Akad. sel'sk. Nauk S.S.S.R.*, 1950, No. 2, pp. 25-32, bibl. 13.

Seedlings planted without a ball of earth show an adverse water balance, which is accentuated by low moisture content of the air. Water deficiency is indicated by wilting, first of the lower leaves, then in those of the middle of the stem, and then in the upper leaves and the apex of the stem. To hasten re-rooting it is necessary that plastic substances should accumulate in the plants. Therefore, for 8 to 10 days before transplanting the expenditure of the plastic substances for growing processes should be reduced to a minimum by decreasing shading and watering, and the removal of the frames from the forcing beds.

924. SWANBACK, T. R., AND ANDERSON, P. J.

**Fertilizing Connecticut tobacco.**

*Bull. Conn. agric. Exp. Stat.* 503, 1947, pp. 47, bibl. 89 [received 1950].

There are about 17,000 acres under tobacco in Connecticut. All tobacco is grown for use in cigars. The soils are sandy loams of varying degrees of fineness. The authors attempt to condense into this one bulletin

the pertinent and essential information on the manuring of tobacco derived from three-quarters of a century of experiment, analyses and experience. Details of method, analyses, argument and the like are omitted, but a comprehensive list of relevant publications indicates where such detail can be found. To all interested in the basic problems of the scientific tobacco grower this publication is commended.

925. SCARAMUZZI, G.

**Metodi rapidi di diagnosi delle carenze minerali nel tabacco. (Rapid methods of diagnosing mineral deficiencies in tobacco.)**  
*Tabacco*, 1949, 53: 598, from abstr. *Rev. appl. Mycol.*, 1949, 28: 598.

The author describes "absorption" methods for the diagnosis and treatment of abnormalities due to mineral deficiencies and the application of these methods to tobacco plants by means of injections into the leaf veins, leaf stalk, and shoot tip.

926. TIMONIN, M. I.

**Azotobacter preparation (Azotogen) as a fertilizer for cultivated plants.**

*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 246-50, bibl. 21.

An investigation was made, under various field conditions, of the effect of Azotogen, a bacterial preparation, on the yield of tobacco, oats and potatoes. The preparation of Azotogen and the methods of application are outlined. Inoculation did not significantly affect the yield of any of these crops. Soil analysis showed that the azotobacter was able, not only to survive in the rhizosphere of the inoculated tobacco plants, but also to migrate from the source of inoculation to a depth of 15 inches. This fact indicates that conditions in the rhizosphere of tobacco plants were favourable for multiplication of azotobacter. In spite of this, however, they failed to stimulate growth of the plants or to supply them with additional nitrogen. Tomatoes, grown as a preceding crop, had an adverse effect on the activity of azotobacter in both the inoculated and uninoculated root systems of tobacco plants.—Div. Bact. and Dairy Res., Dep. Agric., Ottawa.

927. WOLTZ, W. G., REID, W. A., AND COLWELL, W. E.

**Sugar and nicotine in cured bright tobacco as related to mineral element composition.**  
*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 385-7, bibl. 12.

The authors present the first findings of an extensive study of the relationships between the chemical constituents of the cured leaf of bright tobacco and leaf quality. The scope of this paper is confined to a study of the relationship of nitrogen, phosphorus, potassium, calcium, magnesium and chlorine in the leaf to the two organic constituents, sugar and nicotine, both of which affect leaf quality. The data are based on one experiment only. Results indicated that (1) sugar content was inversely related to total nitrogen and directly related to phosphorus and chlorine. Potassium, calcium, and magnesium did not affect the sugar content significantly. (2) Nicotine content was directly related to total nitrogen and calcium and inversely related to phosphorus. Potassium, magnesium, and

chlorine did not affect the nicotine content significantly. The magnitude of the various effects is discussed."—N.C. agric. Exp. Stat., Raleigh.

928. LAL, K. N., AND TYAGI, R. S.

Deficiency, favourable, and toxic effects of boron on tobacco.

Amer. J. Bot., 1949, 36: 676-80, bibl. 38.

This paper describes some of the deficiency, favourable, and toxic effects of boron on tobacco plants grown in (a) water culture, (b) sand-nutrient culture, and (c) soil respectively. Boron deficiency caused bleaching of the leaves from the base upwards. Development of yellowish interveinal spots with white centres, more prominent in mature leaves, was also observed. With prolonged deficiency, development of white, leathery leaf margins with yellowish centres took place. Veins remained green for a long time. Stem tips remained underdeveloped. Growth was checked. Low concentrations of boron (of the order of 0.5-1.0 p.p.m.) improved vegetative vigour and delayed flowering. Symptoms of toxicity were noted in all cultures containing more than 1.0 p.p.m. boron. Brownish burnt spots were formed, which joined and dried out. Leaves appeared unable to withdraw water rapidly from the xylem vessels as the tissues surrounding the veins were killed. They remained continually flaccid, and ultimately death ensued as a result of disturbed water relations and desiccation of the tissue.—Benares University, India.

929. CLAYTON, E. E.

Study of disease resistance from interspecific crosses.

Abstr. in *Phytopathology*, 1950, 40: 5.

Results indicate that cultivated tobacco can be greatly improved by transfer of immunity to blue mould and black root rot from *Nicotiana debneyi* and of similar high level resistance to wildfire, blackfire, and black shank from *N. longiflora*.

930. TODD, F. A., LUCAS, G. B., AND MOORE, E. L.

Chemical treatment of tobacco plant bed soils for weed and disease control.

Abstr. in *Phytopathology*, 1950, 40: 29.

The preparations tried were effective against weeds, root knot (*Heterodera marioni*) and black shank (*Phytophthora nicotianae*). Allyl alcohol (6 and 8 qts. per 100 gal. water) applied at the rate of 1 gal. per sq. yd. effectively controlled weeds and, when applied in the spring 2 weeks before seeding, reduced root knot. Fall treatments (cyanamide 1 lb. + sodium azide  $\frac{1}{4}$  lb. per sq. yd. and sodium nitrite-nitrate 1 lb. per sq. yd.) controlled nematodes and weeds. Methyl bromide was effective against weeds and black shank, and reduced root knot.

931. ANDERSON, P. J.

Controlling diseases of tobacco.

Bull. Conn. agric. Exp. Stat. 527, 1949, pp. 55.

Decay and storage diseases are omitted. Otherwise the control of the chief tobacco diseases as they occur in Connecticut from seedbed to curing shed is dealt with. Nutritional disorders and nematode infection and soil sterilization are also considered.

932. RILEY, E. A.

Pathological and physiological studies on the brown spot disease of tobacco caused by *Alternaria longipes* (Ell. & Ev.) Mason.

Mem. Dep. Agric., S. Rhod. 3, 1949, pp. 34, bibl. 20, illus.

The optimum temperature for the development of brown spot of tobacco is about 30° C. No infection occurred below 18° C. The fungus was slightly pathogenic to a number of solanaceous plants, two of which are common weeds in Rhodesia. Of four varieties of tobacco tested, Orinoco White Stem was least susceptible. Tobacco seedlings were only slightly susceptible to infection, susceptibility increasing with age. Plants grown at high nitrogen, phosphorus and potassium levels were least susceptible.

933. WOLF, F. A., WHITCOMB, W. H., AND MOONEY, W. C.

Leaf-curl of tobacco in Venezuela.

J. Elisha Mitchell sci. Soc., 1949, 65: 38-47, bibl. 33, illus.

The symptoms of tobacco leaf-curl are curling, twisting and deformation of leaves and dwarfing of the plants. White-flies are vectors of the virus causing the disease, in Venezuela *Bemisia tuberculata* and *Aleurotrachelus socialis* acting as vectors. Many species of plants develop leaf curl when fed upon by viruliferous white-flies. There is some evidence that in Venezuela both tobacco and tomato plants serve as reservoirs of virus for successive crops of tobacco.

934. MILLER, P. R., AND O'BRIEN, M.

January temperatures in relation to the distribution and severity of downy mildew of tobacco. II. A review of the past nineteen years.

Plant Dis. Repr., 1949, 33: 418-25.

Five years out of nineteen have been considered severe blue mold years. There seems to be a high coincidence between the intensity of blue mould in the five severe years and the above-normal January temperature in those years.—Div. Mycol. and Dis. Survey, Beltsville, Maryland.

935. ANDERSON, P. J.

Pole rot of tobacco.

Bull. Conn. agric. Exp. Stat. 517, 1948, pp. 19.

All the types of rot found to damage tobacco while hanging on the poles in the curing sheds in Connecticut are considered. Excessive moisture produces conditions favourable to the growth of the organisms concerned, *Alternaria tenuis*, *Sclerotinia sclerotiorum* and *Botrytis cinerea*, and the best methods of eliminating excess moisture in the curing shed are discussed.

936. TURNER, N.

Control of insects on tobacco.

Circ. Conn. agric. Exp. Stat. 167, 1948, pp. 4.

Tentative suggestions for the use of gamma benzene hexachloride, tetraethyl pyrophosphate, parathion and DDT.

937. MORGAN, W. L.

Control of insect pests of tobacco: new insecticides tested.

Agric. Gaz. N.S.W., 1949, 60: 536-8, 556.



Seedbeds should be treated each week with 0.05% DDT spray (1 fluid oz. 20% emulsion to 2½ gal. of water) or with 1% DDT dust. In the field, crops should be treated three times at fortnightly intervals with 0.1% DDT spray or 2% DDT dust, and treatment should start within a fortnight of transplanting.

938. CHAMBERLIN, F. S.

Experiments to control aphids on shade-grown tobacco.

*J. econ. Ent.*, 1949, 42: 544.

Aphid infestations, consisting mainly of *Myzus persicae*, have recently become an important menace to the production of shade-grown cigar wrapper tobacco in Florida and Georgia. In 1948 experiments were made in co-operation with the North Florida Agricultural Experiment Station to control these infestations. Five applications of 1% parathion dust held the aphid population to an extremely low level throughout the season. No serious aphid damage was sustained, the material did not cause injury to the plants, and the applications remained effective for about 2 weeks. Benzene hexachloride and nicotine dusts failed to give control of the aphids.—Bur. Ent. Pl. Quar. U.S.D.A.

939. TURNER, N.

Control of aphids on tobacco.

*J. econ. Ent.*, 1949, 42: 561-2, bibl. 3.

Increasingly large infestations of aphids on tobacco in 1946 and 1947 coincided with the widespread use of DDT on potatoes, normally infested by the same aphid. This fact suggests that DDT may have a repellent effect on the aphid. Applications of DDT to uninfested tobacco plants in seedbeds largely prevented infestation. Parathion, DDT, chlorinated camphene and benzene hexachloride were tested for aphid control on infested plants in small plots. Of these materials, parathion dusts were the most effective. Aeroplane applications of concentrated sprays of parathion wettable powder and emulsion, at the rate of about 0.2 lb. parathion per acre, were remarkably effective. Connecticut Agricultural Experiment Station, New Haven.

940. VAN DER MEER MOHR, J. C.

*Achatina fulica* (Fer.) as a minor pest of tobacco.

*Chron. Nat.*, 1949, 105: 290, illus.

The giant snail, *Achatina fulica* (Fer.), has recently been causing minor damage to tobacco on estates in the Serdang district of the East Coast of Sumatra. The rind at the base of the stems of 1½-2-month-old plants is eaten off, and in severe cases the stalk may break at the point of damage. This attack is thought to be due to the enormous increase in the population of *A. fulica* in many parts of this tobacco-growing district; the author does not consider, however, that the snail will ever become a serious pest of Deli tobacco.

941. DE PERALTA, F.

A method of pre-drying and flue-curing Virginia tobacco.

*Philipp. J. Agric.*, 1949, 14: 19-27, bibl. 2, illus.

In 1943-44 the flue-curing requirements of Virginia tobacco in the Philippines were studied for the first time in detail, first on a laboratory scale and later on a large scale in a flue-curing barn, the design of which is here

described diagrammatically. The barn was used successfully both for pre-drying with periodic sprinkling of the floor with water and for drying. An alternative etiolation chamber that also proved satisfactory was a dugout with a layer of soil 18 inches thick as cover, the only openings being the door at one end and a ventilation window opposite. Within the dugout temperatures ranged from 24° to 27° C. and humidities from 79% to 86%, which were within the range of air conditions used in the laboratory. Two varieties, Cash and Gold Dollar, showed as much as 94% and 91% leaves cured yellow respectively, and as the times taken were the same they could be grown together where only one flue-curing barn is available. Six other varieties were less satisfactory, yellowing in the etiolation chamber being slower, and where only one barn is available they should not be grown in conjunction with the two varieties named above.

### Fibres.

942. SOIL SCIENCE SOCIETY OF FLORIDA.

Symposium III. Production of long vegetable fibres in Florida with particular reference to ramie.

*Proc. Soil Sci. Soc. Fla.*, 1946, 8: 119-56 [received 1950].

The attention of readers interested is drawn to the following papers: Outlook for the production of long vegetable fibers in S. Florida, pp. 119-26; field culture of ramie under Everglades conditions, pp. 127-34; the mechanical decortication of long vegetable fibers, pp. 135-41; methods of degumming and subsequent handling of ramie for use in the textile industry, pp. 141-3; certain variations in natural cellulose fibers, pp. 144-50; ramie fiber as a source of cellulose for the production of high grade paper, pp. 151-3; chlorophyll and vitamin extraction from ramie and other green plant material, pp. 154-6.

943. CRITCHFIELD, H. J.

New Zealand *Phormium* fiber.

*For. Agric.*, 1950, 14: 41-3, illus.

A popular account of the *Phormium* fibre industry of New Zealand, now limited to three plantations but showing signs of revival.

### Hops.

944. FLETCHER, L.

Brewing trial with a new variety hop, Ref. No. OT48.

*J. Inst. Brew.*, 1949, 55: 369-70.

Small-scale brewing trials with this variety (raised by Professor Salmon at Wye College in 1927) which has previously been found to have some degree of resistance to *Verticillium* wilt, have shown that it imparts no objectionable flavours to beer and that it can, therefore, be strongly recommended for future trials.

945. BARTON-WRIGHT, E. C.

The fermentation industries.

*A.R. Progr. appl. Chem.*, 1947, 32: 389-401, bibl. 53.

Includes a 2½-page discussion of the recent literature on hop diseases, propagation and varieties in England.

946. BISHOP, L. R.  
The fermentation industries.  
*A.R. Progr. appl. Chem.*, 1948, **33**: 546-72,  
bibl. 287.

Refers *inter alia* to hops, especially to varieties, disease control, the extraction and purification of humulon and lupulon, the determination of  $\alpha$ - and  $\beta$ -hop acids and the measurement of preservative properties.

947. SALMON, E. S.  
Two new hops resistant to *Verticillium*-wilt.  
*J. Inst. Brew.*, 1949, **55**: 234-6, bibl. 4,  
illus.

Two new hops "moderately resistant" to *Verticillium* wilt are described. They are symptomless carriers of mosaic disease, but are more susceptible to downy mildew than is Fuggle. The results of brewing trials are given.

948. KELLER, K. R., AND LI, J. C. R.  
The relationship between the number of vines  
per hill and yield in hops (*Humulus lupulus*,  
L.).  
*Agron. J.*, 1949, **41**: 569-73.

The yield of hills is related to the number of vines from each. The relationship appears to be represented by a parabola, the crop probably being a maximum when there are six vines to a hill.—Division of Tobacco, Medicinal and Special Crops, Bur. Pl. Ind., Soils and agric. Engng, U.S. Dep. Agric. S.C.P.

### Herbs, drugs and sundry.

949. MAURON, —.  
Le carthame en Berry. (Safflower growing  
in Berry.)  
*Prog. agric. vitic.*, 1949, **132**: 365-9.

An account of safflower [*Carthamus tinctorius*] growing in Berry (Cher, Central France) describing its introduction to that region, and the losses caused by the drought of 1949, with notes on manuring. The author considers it to be a crop that could be grown with advantage there.

950. THOMAS, C. A.  
Seed treatment of safflower and varietal  
susceptibility to *Alternaria* blight.  
Abstr. in *Phytopathology*, 1950, **40**: 28.

Ceresan M and New Improved Ceresan gave complete control and resulted in a 100% increase in stand. Certain selections were highly resistant to blight (*Alternaria carthami*).

951. NELSON, R.  
Development of varieties of spearmint  
resistant to *Verticillium* wilt and to rust.  
Abstr. in *Phytopathology*, 1950, **40**: 20.

With soil temperatures and moisture optimum for wilt, some of the selections obtained from hybridizations were highly resistant to wilt and rust (*Puccinia menthae*) and yielded larger quantities of oil than the seed parents.

952. CHATTERJEE, R.  
The Rasāñjana of the Hindus.  
*Lloydia*, 1949, **12**: 178-82, bibl. 35.

Rasāñjana, a drug known before 600 B.C., is derived from certain species of barberry, notably *Berberis asiatica*, *B. aristata* and *B. lycium* as also from

*Mahonia nepalensis*. Its use against fevers and infections of different sorts is discussed.

953. BĂLĂNESCU, G.  
Plantes à tubercules, autres que les pommes  
de terre, en tant que matières premières pour  
les industries agricoles et alimentaires. II.  
*Dahlia variabilis* (Le Dahlia). (Tuberous  
plants, other than potato, useful as raw  
material for agricultural and food industries.  
The dahlia.)

*Bull. Ét. Rech. tech. Buc.*, 1949, **1**: 147-57,  
bibl. 13.

Dahlia as well as sunflower tubers are excellent raw material for providing inulin, ethyl alcohol, and fructose, and dahlia tubers yield phytin. The total phosphorus content and the distribution of this element in its different compounds was investigated. About half the phosphorus present is in the form of phytin. Dahlia tubers do not yield a good substitute for coffee.

954. SHORT, G. R. A.  
Essential oils, isolates and derivatives.  
*A.R. Progr. appl. Chem.*, 1947, **32**: 414-22,  
bibl. 67.

Twenty-six plants are mentioned as sources of essential oil, and some details are given of their oils.

955. SHORT, G. R. A.  
Essential oils, isolates and derivatives.  
*A.R. Progr. appl. Chem.*, 1948, **33**: 620-32,  
bibl. 99.

Includes data on the composition and characters of essential oils from some 30 named plants.

956. BENEDICT, H. M.  
A further study on the nonutilization of  
rubber as a food reserve by guayule.  
*Bot. Gaz.*, 1949, **111**: 36-43, bibl. 11.

Guayule plants (*Parthenium argenteum*) were exhausted of food reserves by repeated defoliation from 20 January to 1 June. The content of free sugars, levulin, inulin, pentosans, resins and rubber in stem and root sections was determined at the beginning and end of this period. Although sugars, levulin, inulin and pentosans were very severely depleted as a result of defoliation, no loss of rubber hydrocarbon occurred. It is concluded that rubber does not serve as a food reserve in guayule. This result confirms that obtained by Traub [see *H.A.*, 17: 2367] in a similar experiment carried out during the autumn and winter.

957. OSTROVSKAJA, L. K.  
The particular characters of the peroxidase  
reaction in kok saghyz. [Russian.]  
*Biohimija* (Biochemistry), 1950, **15**: 14-24,  
bibl. 10.

NaNO<sub>2</sub> reduces the guaiacol peroxidase reaction in kok saghyz and intensifies it in other plants such as sugar beet, mahorka, and horse-radish.

958. THOMAS, C. A.  
Observations on diseases of some special  
crops.  
*Plant Dis. Repr.*, 1949, **33**: 453-4.

Notes on diseases of castor bean, digitalis, safflower, mint, sumac, and coriander.—U.S. Department of Agriculture, Div. of Tobacco, Medicinal and Special Crops.



## Noted.

- 959.
- a ALI, M. A.  
Genetics of resistance to the common bean mosaic virus (bean virus 1) in the bean (*Phaseolus vulgaris* L.).  
*Phytopathology*, 1950, 40: 69-79, bibl. 7, illus.
- b BADGETT, C. O., AND OTHERS.  
Rutin content of several varieties of *Nicotiana rustica* and *N. glauca*.  
*Arch. Biochem.*, 1949, 24: 245-50, bibl. 13.
- c BAKER, W.  
Occurrence of dulcitol as exudate from *Euonymus japonicus* and *E. europaeus*.  
*Nature*, 1949, 164: 1093-4.
- d CALDER, A. J., AND CARTER, C. L.  
The essential oil of *Pittosporum tenuifolium*.  
*J. Soc. chem. Ind. Lond.*, 1949, 68: 355-6, bibl. 7.
- e CHANCE, B.  
The properties of the enzyme-substrate compounds of horseradish peroxidase and peroxides. III. The reaction of complex II with ascorbic acid. IV. The effect of pH upon the rate of reaction complex II with several acceptors and its relation to their oxidation-reduction potential.  
*Arch. Biochem.*, 1949, 24: 389-409, bibl. 12, and 410-21, bibl. 13.
- f DAVIS, G. B., AND MUMFORD, D. C.  
Cost of producing sweet corn in the Willamette Valley, Oregon.  
*Stat. Bull. Ore. agric. Exp. Stat.* 465, 1949, pp. 23.
- g DAVIS, G. B., AND MUMFORD, D. C.  
Cost of producing table beets in the Willamette Valley, Oregon.  
*Stat. Bull. Ore. agric. Exp. Stat.* 466, 1949, pp. 22.
- h DAVIS, G. B., AND MUMFORD, D. C.  
Cost of producing carrots in the Willamette Valley, Oregon.  
*Stat. Bull. Ore. agric. Exp. Stat.* 467, 1949, pp. 20.
- i DIOS, R., AND VIEITEZ, M. G.  
Contribución al estudio de los aceites vegetales en dependencia con el clima y suelo. I. Aceite de *Camellia japonica* L. (A contribution to the study of vegetable oils as affected by climate and soil. I. Oil of *Camellia japonica* L.) [English summary  $\frac{1}{2}$  p.]  
*An. Edaf. Fis. veg.*, 1949, 8: 791-810, bibl. 51.
- j DUISBERG, P. C., SHIRES, L. B., AND BOTKIN, C. W.  
Determination of nordihydroguaiaretic acid in the leaf of *Larrea divaricata* (Creosote Bush).  
*Analyt. Chem.*, 1949, 21: 1393-6, bibl. 10.
- k GALINSKY, I.  
The effect of certain phosphates on mitosis in *Allium* roots.  
*J. Hered.*, 1949, 40: 289-95, bibl. 23, illus.
- l KAR, B. K.  
A note on isolated potato "eyes" as seeds for propagation.  
*Indian J. Hort.*, 1944, 2: 41-2 [received 1949].
- m LIBBY, W. C., AND AKELEY, R. V.  
Potato variety testing and release program in Maine.  
*Amer. Potato J.*, 1949, 26: 404-9.
- n MARCELLI, E.  
Prove sulla suscettibilità all' "Oidio" di diverse specie e razze di tabacco. (Tests on the susceptibility to powdery mildew of species and varieties of tobacco.)  
*Not. Mal. Piante*, 1949, No. 6, pp. 21-4.
- o MICHAELSON, M. E., SCHAAL, L. A., AND FULTS, J. L.  
Some effects [inhibiting] of 2,4-dichlorophenoxyacetic acid, its salts, and esters on several physiologic strains of the potato scab organism *Actinomyces scabies* (Thaxt.) Guss.  
*Proc. Soil Sci. Soc. Amer.*, 1948, 13: 267-70, bibl. 9.
- p MOLINA, J. S., AND MERZARI, A. H.  
Influencia del aceite esencial de hinojo en el proceso fermentativo de aceitunas verdes "tipo español". I. Accion inhibitoria sobre el desarrollo de las levaduras formadoras de velo superficial. (The influence of the essential oil of fennel on the fermentation process of "Spanish-type" green olives. I. Inhibitory action on the development of the film-forming yeasts.) [English summary  $\frac{1}{2}$  p.]  
*Rev. argent. Agron. B. Aires*, 1949, 16: 234-43, bibl. 11, illus.
- q MORETTINI, A.  
La produzione delle sementi orticole in Italia. (The production of vegetable seed in Italy [in 1938].)  
*Estr. Atti della XXVII Riunione della Società per il Progresso delle Scienze*, Rome, 1938, pp. 4 [received 1949].
- r SALAMAN, R. N.  
Disease-resistance in potatoes: an historical note.  
*Emp. J. exp. Agric.*, 1949, 17: 238-44, bibl. 16.
- s SCHAAL, L. A., EDMUNDSON, W. C., AND KUNKEL, R.  
Yampa, a new scab\*-resistant potato.  
*Amer. Potato J.*, 1949, 26: 335-42, bibl. 3.
- t STEVENSON, F. J., AND DELONG, G. E.  
Canus, a new potato variety adapted to Alberta and other sections of the Dominion of Canada.  
*Amer. Potato J.*, 1949, 26: 326-30, bibl. 3.

\* *Actinomyces scabies*.

- u VENNING, F. D.  
Investigations on the morphology, anatomy, and secondary growth in the main axis of Marglobe tomato (*Lycopersicon esculentum* Mill.).  
*Amer. J. Bot.*, 1949, 36: 559-67, bibl. 13, illus.
- v WELLS, D. G., WALKER, J. C., AND HARE, W. W.  
A study of linkage between factors for resistance to wilt and near-wilt in garden peas.  
*Phytopathology*, 1949, 39: 907-12, bibl. 11.

- w WILLIAMS, W. T.  
Function of urease in *Citrullus* seeds.  
*Nature*, 1950, 165: 79.
- x YEPES, Y. E., AND MOLINA, B. L.  
Experimentos en Antioquia con fertilizantes para papa. (Fertilizer experiments with potatoes in Antioquia.)  
*Rev. Fac. nac. Agron. Colombia*, 1949, 9: 71-80.

## FLORICULTURE.

### General.

(See also 529, 1183.)

960. ANON.  
Wisley trials, 1949.  
*J. roy. hort. Soc.*, 1950, 75: 117-34, illus.  
Notes on the varieties of antirrhinum, including 8 stocks for which rust resistance is claimed, early flowering chrysanthemums and dahlias, under trial at Wisley in 1949.
961. GREBINSKIĬ, S. O., AND ROLIK, R. P.  
The effect of mineral fertilizers on the viability and size of pollen. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1949, 68: 1109-12, bibl. 1.  
Plants of *Begonia semperflorens* and *Primula obconica* were grown in pots of garden soil and watered with solutions of potassium nitrate and monobasic potassium phosphate, and the pollen grains periodically examined for size and viability. It was found that, in comparison with control plants not receiving added nutrients, potassium nitrate lowered viability, phosphate raised it a little, and a mixture of the two markedly increased it, that the size of the pollen grains was decreased by nitrate, but that there was a tendency to increased size by phosphate and a mixture of nitrate and phosphate.
962. ARK, P. A., AND MIDDLETON, J. T.  
Pythium black rot of cattleya.  
*Phytopathology*, 1949, 39: 1060-4, bibl. 3, illus.  
A black rot disease of cattleya, caused by *Pythium ultimum*, occurs on seedlings and on mature, flower-bearing plants in Californian greenhouses. The seedling phase of the disease was controlled by watering the pots with a 1:2,000 concentration of 8-hydroxyquinolin benzoate (Bioquin 700). The treatment can safely be repeated every week until no more disease appears. Watering the plants with a copper solution at 1 and 10 p.p.m. was also effective. This treatment may be repeated, but not often, because too much copper may accumulate in the fibre.—Univ. of California.
963. JENSEN, D. D.  
Breaking of cattleya orchid flowers by orchid mosaic virus and its transmission by aphids.  
*Phytopathology*, 1949, 39: 1056-9.  
Experiments are described with a previously undescribed

virus disease which causes a leaf mosaic and breaking of cattleya flowers in California. The green-peach aphid, *Myzus persicae*, proved to be a vector.—University of California.

964. DIMOCK, A. W., AND FORD, C. H.  
Control of foliar nematode disease of chrysanthemums with parathion sprays.  
Abstr. in *Phytopathology*, 1950, 40: 7.  
In field tests to assess the value of various insecticides as foliage sprays for the control of chrysanthemum leaf nematode (*Aphelenchoides ritzema-bosi*), "spectacular control" was obtained with parathion.
965. GREEN, D. E., AND HEWLETT, M. A.  
A cineraria disease new to Great Britain.  
*Gdnrs' Chron.*, 1949, 126: 216-17, illus.  
Specimens of *Cineraria cruentus* affected with an unusual leaf spot have been received at Wisley from two different sources in Kent. The leaves showed dark, water-soaked patches that developed into rapidly spreading brown spots about  $\frac{1}{4}$  to  $\frac{1}{2}$  in. in diameter. Spots also appeared on the petioles, causing a rot. Examination showed the disease to be caused by a species of *Alternaria*, probably *A. senecionis*. This fungus has not been recorded on cinerarias in England before, but has caused serious damage in Denmark. Growers are advised to isolate affected plants and to give a protective spray of colloidal copper.
966. MARKOVIČ, A. A.  
The vernalization of clary. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1949, 68: 1117-20, bibl. 9.  
Annual and biennial varieties of clary (*Salvia sclarea*) differ particularly in the length of the vernalization stage. Clary is vernalized in the seed at temperatures of 0° to 3° C. Prolonging its vernalization stage guarantees 100% flowering in the first year in the Moscow province, 30 days for the annual variety and 90 days for biennial. In an unmanured field fewer plants flower the first year than those under favourable nutrition and moisture conditions.
967. LASKARIS, T.  
Fusarium stem canker and wilt of delphinium.  
*Phytopathology*, 1949, 39: 913-19, bibl. 8, illus.  
The stem canker and wilt disease of delphiniums, the symptoms of which are described, is attributed to *Fusarium oxysporum* f. *delphinii* n.f.—Univ. Minnesota.



968. RORK, C. L.

**Cytological studies in the Gentianaceae.**

*Amer. J. Bot.*, 1949, 36: 687-701, bibl. 47, illus.

An exploratory study of the chromosome numbers and cytological relations in the Gentianaceae was made in the hope of improving the classification within the family on this basis. As the data are incomplete, the conclusions drawn are necessarily tentative. This study, however, suggests certain definite investigations which would be necessary to the further clarification of the natural relationships of the family.—Houghton College, New York.

969. BECK, G. E., AND VAUGHN, J. R.

**Botrytis leaf and blossom blight of Saint-paulia.**

*Phytopathology*, 1949, 39: 1054-6, bibl. 8.

A leaf and blossom blight of African violet (*Saint-paulia ionantha* Wendl.) occurred for some time in the floricultural greenhouses at Michigan State College. The symptoms are described, and recommendations for control are the removal of diseased and dead tissues, the use of sterile rooting soil, avoiding mechanical injury, and sub-irrigation.—Michigan State College.

#### *Bulbs, tubers, etc.*

970. GOULD, C. J.

**Progress Report on bulb research for 1948/49.**

[Pamph.] *West. Wash. Exp. Stat. Puyallup*, 1949, pp. 7.

The report consists of notes on narcissus basal rot and weed control, iris blindness, crown rot, and fusarium basal rot, and dipping tests with tulip bulbs.

971. MACLEAN, N. A.

**Botrytis species as bulb rotters.**

Abstr. in *N.W. Sci.*, 1949, 23: 15-16.

Research indicates that species of *Botrytis* under greenhouse conditions at Pullman, Washington, may be almost as important bulb and corm rotters as they are stem and leaf spotters. Six hosts (King Alfred narcissus, Wedgewood bulbous iris, tulip, crocus, Picardy gladiolus and Easter lily) were planted in soil inoculated with each of ten species of *Botrytis*. In general, the species of *Botrytis* normally occurring on the leaves and stems of a given host was most damaging to the bulbs or corms of that particular host when compared with its reaction on the other hosts. In most cases each of the six species of bulbs was infected to some degree by each of the ten species of *Botrytis*. Infection ranged from almost complete decay to slight etching. Re-isolations were obtained.

972. MILDBRAED, J., WEYLAND, H., AND KÜEN-  
THAL, H.

Ein seltener Schmarotzer auf Zykamen, *Cuscuta inopinata* Mildbr. et Weyl. nov. spec. (A rare parasite on cyclamen, *C. inopinata* n.sp.)

*Biol. Zbl.*, 1950, 69: 29-33, illus.

The new dodder species described was found on the petiole of a cyclamen leaf.

973. [McCLELLAN, —.]

**Research conducted on basal rot of daffodils.**

*Flor. Exch.*, 1949, 113: 22: 33.

In a talk given at the U.S.D.A. Plant Industry Station, Beltsville, recent work on basal rot [presumably *Fusarium bulbigenum*] is reviewed. Experiments now in progress show that the disease develops very rapidly at soil temperatures of 60°, 65° and 70° F. Inoculated plants flower normally at soil temperatures of 45°, 50° and 55° F., and very little bulb infection occurs at 45° and 50° F. Basal rot can be controlled by treatment with New Improved Ceresan but this may seriously injure the flowers. In fungicide tests made at four centres, Mersolite 8 (phenyl mercury acetate) gave good control of the rot and did not injure the flowers or affect forcing performance. Mersolite 8 is used at the rate of 1 lb. in 800 gal. water, and bulbs should be dipped in the solution for 5 minutes after digging and again before planting. Arasan dust gave effective control in all tests except one.

974. ANON.

**Freesias grow well from seed.**

*Grower*, 1950, 33: 323, 325, illus.

Notes on freesia production by the Dutch firm of Konynenburg and Mark, who recommend this crop as a profitable glasshouse catchcrop if grown from seed. Seed may be sown directly in the soil or raised beds of the glasshouse in April or May, or alternatively it may be sown outside and the plants brought in in September in boxes. With the latter method plants will flower in about 7 months from sowing, and the houses will only be occupied during the winter months. Seed may also be sown in pots plunged in a cold frame during summer and the plants planted out in the glasshouse during August. Brief cultural details are given of these three methods.

975. STUART, N. W., GOULD, C. J., AND EMS-  
WELLER, S. L.

**Effect of after-harvest and precooling temperatures on iris.**

Repr. *Flor. Rev.*, 28 July, 1949, pp. 2.

Time of blooming of Wedgewood iris bulbs depends on bulb size (earliest in 10 cm., latest in 8 cm. bulbs), and on the temperature at which the bulbs are precooled (earliest after 50°, latest after 40° F.). Plants from bulbs stored at 65° F. bloomed later, with heavier stems, than plants from precooled bulbs. After-harvest curing of the bulbs at 75° or 85° F. followed by precooling or storage at 65° F. increased the earliness of bloom by 2 to 23 days over bulbs that were not cured. Size and precooling affected the amount of blindness. Most blindness was in plants from 8 cm. and least in those from 10 cm. bulbs.

976. ACKER, R. M.

**Growth of three varieties of *Lilium* from bulbs stored in vapors of methyl ester of naphthaleneacetic acid.**

*Bot. Gaz.*, 1949, 111: 21-35, bibl. 12, illus., being *Contr. Hull Bot. Lab.* 608.

A series of experiments was conducted to determine the effect of various concentrations of MENA vapour during storage on the 3 lily varieties, *Lilium longiflorum* vars. Estate and Croft, and *L. regale*. 1. Croft and Estate bulbs were stored at 34° F. for 54, 91 and 129

days at concentrations of 0.0, 0.062, 0.62 and 6.2 g. MENA per cu. ft. and planted out in succession. Plants from bulbs stored at the 2 lower concentrations flowered 2 weeks earlier than the controls at all plantings. At the second and third plantings greater dry weight of shoots and larger flowers were produced. A greater number of bulblets was also produced by Croft bulbs stored at the 2 higher concentrations in all plantings. 2. Regal bulbs were stored at 34° F. at the previously used concentrations of MENA for 108, 149 or 156 days. They were all planted on the same day. Plants from all treatments grew at about the same rate, except that those from bulbs treated with the highest concentration of MENA were stunted, the longest period of exposure producing the greatest degree of stunting. The 2 lowest concentrations greatly stimulated root production. The highest concentration resulted in the production of many roots, but these were fasciated and tumour-like. 3. Estate, Croft and Regal bulbs were stored in the previously used concentrations of MENA for 48 days at 34° F. followed by 59 days at 50° F. In all treatments bulbs sprouted within 30 days after transfer to the higher temperature. The growth of all plants was about the same, except that those which had received the highest concentration of growth regulator were severely stunted.—Camp Detrick, Frederick, Md.

977. MOORE, W. C.

**Grey bulb rot of tulip.**

*J. roy. hort. Soc.*, 1950, **75**: 113-17, illus.

Grey bulb rot (*Sclerotium tuliparum*) of tulips and bulbous irises has spread very rapidly in England since it was first recorded in 1922. The author presents a series of maps illustrating its spread, and gives a detailed account of the symptoms and methods of control of the disease. Hygiene, crop rotation and sterilization of the soil by steam, formaldehyde or pentachloronitrobenzene are the only effective control measures known.—Plant Path. Lab., Harpenden.

*Roses.*

978. SEELEY, J. G.

**Potassium deficiency of greenhouse roses.**

*Flor. Exch.*, 1949, **114**: 2: 14-15, bibl. 6, illus.

Potassium deficiency symptoms of roses were studied in sand culture experiments at Cornell University, to supplement observations previously made on roses grown in low potassium soils. The symptoms in both cases were similar but were more severe in plants grown in sand culture. The varieties Peter's Briarcliff and Hildegard were used. The first evidence of potassium deficiency was smaller flowers and leaves and shorter shoots. In severely deficient plants the flower shoots were only 2-8 in. long and flowers were 1½ in. in diameter. Many of the shoots were blind. Some flower buds developed to a diameter of ¼-½ in. and became dry; the stems then started to die back. On some flower shoots there was a dark brown or black ringing of the stem an inch or two below the flower bud. There was no more marginal burning of leaves on potassium deficient plants than on normal plants. When potassium was supplied to deficient plants they resumed normal growth within a month. This

indicates that potassium is rapidly absorbed, translocated and utilized in the rose plant.

979. PROČEČKO, E. P., AND ŠTANJKO, I. I.

**Disinfecting the root system of roses.**

[Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 12, p. 50.

A mixture of 5% copper sulphate, clay and sand, at a cream-like consistency, having been recommended for dipping the root systems of fruit trees and roses as a protection against crown gall, was tried on roses and found to cause great damage to the roots.

980. SMITH, F. F., AND FULTON, R. A.

**Variation in resistance of two-spotted spider mites to aerosols and sprays.**

*Flor. Exch.*, 1949, **113**: 23: 15, 49-51, bibl. 2.

During the past year several cases of resistance of the two-spotted spider mite (*Tetranychus bimaculatus*) to parathion in aerosols have been reported in the United States. An investigation revealed the existence of a resistant strain of mite. This strain occurs mostly on glasshouse roses but has also been found on other flower and food crops grown under glass. Various materials used in aerosols were tested for control of these resistant mites, but only octamethyl pyrophosphoramide, p-chlorophenyl p-chlorobenzene-sulphonate and tetraethyl dithiopyrophosphate gave promising results; of these, only the last is available commercially. This material should be used at a dosage of 1 lb. of 5% aerosol (Formula A-178), with a 2-hour or overnight exposure, and at temperatures between 75° and 80° F. At temperatures of 90° F. or above it has injured roses. Treatments should be made in between crops until more is known about its performance in greenhouse conditions.

*Shrubs.*

981. MOTT, W. P., Jr.

**Artificially dwarfed trees.**

*Brooklyn bot. Gdn Rec.*, 1949, **5**: 149-53.

Notes on the Japanese art of growing trees, artificially dwarfed and shaped, in shallow pans.

982. TERRIER, C.

La "tacheture" des fleurs d'azalées provoquée par le champignon *Ovinia azaleae* Weiss; la présence de cette maladie en Suisse. (Flower spot of azaleas, caused by *O. azaleae*; its occurrence in Switzerland.) *Rev. hort. suisse*, 1950, **23**: 79-84, bibl. 7, illus.

The disease, which has been described by F. Weiss and other workers in the United States, has now made its appearance at Lausanne. Under favourable conditions the small, isolated spots occurring on the petals of azalea flowers soon grow to 5-10 mm. in diameter, the blossom wilts and the plant becomes unsaleable. The fungus responsible was identified as *Ovinia azaleae* and its life cycle is illustrated. As soon as the trouble is observed, all infected or suspected plants should be burnt and healthy plants removed to another glasshouse. In America Dithane was found to have a protective action.



983. NETTLEINGHAME, F.

**Bamboos can be grown anywhere !***Fruitgrower*, 1949, **108**: 935-6.

The author, from his wide experience with the British Bamboo Cane Co. Ltd., Lanivet, contests some of the statements made in A. E. Haarer's article "Bamboo growing in England" [*Fruitgrower*, 1949, **108**: 799-800; *H.A.*, **20**: 373]. He gives instances of successful bamboo production in many counties of England, and even in Scotland, and describes some of the methods of cultivation used by his firm.

984. WELLS, J. S.

**Magnolias from stem cuttings.***Amer. Nurseryman*, 1949, **90**: 10: 7-8, 65, illus.

An account of the method by which magnolias were propagated successfully on a large scale by means of soft wood cuttings. Cuttings of firm wood were taken from early July till early September, relatively short shoots which were forming flower buds at the tip being considered especially suitable. They were wounded at the base and dipped in a hormone powder; one containing 0.8% indolebutyric acid was found to be most satisfactory. The cuttings were rooted in a greenhouse over bottom heat and syringed daily to prevent leaf drop. Potted plants were overwintered in a cold frame. It was found that only plants that had started into growth, or of which the terminal bud had started to swell before leaf fall, overwintered successfully. The species *soulangeana*, *soulangeana nigra*, *stellata*, *stellata rosea*, and *lennei* were propagated in this way.

985. RANDHAWA, M. S.

**Ornamental flowering, foliage and shade trees of Northern India.***Indian J. Hort.*, 1945, **3**: 56-85 [received 1949].

Some 80 species are listed with brief descriptions and in some cases notes on propagation.

986. GALLE, F. C., AND NANK, E. E.

***Viburnum* leaf patterns.***Amer. Nurseryman*, 1949, **90**: 9: 10-13, 62-6.

A description of the decorative value and leaf patterns, all of which are illustrated, of 36 horticultural varieties of *Viburnum*.

*Noted.*

987.

a AMMAL, E. K. J.

**A triploid *Kniphofia*.***J. roy. hort. Soc.*, 1950, **75**: 23-6, illus.The origin of *Kniphofia snowdeni* is discussed.

b

BOIS, E.

**Nouveautés en chrysanthèmes. (New chrysanthemum varieties.)***Rev. hort. suisse*, 1950, **23**: 50-4, illus.

c

CORNUZ, L. A.

**La taille des rosiers. (The pruning of roses.)***Rev. hort. suisse*, 1950, **23**: 94-8, illus.

d

HARDER, R., AND GÜMMER, G.

**Infloreszenzverlaubung und Grösse des Blühimpulses bei *Kalanchoë Blossfeldiana*. (Phylломorphosis of the inflorescences and strength of flowering impulse in *Kalanchoë blossfeldiana*.)** [English summary 9 lines.] *Biol. Zbl.*, 1949, **68**: 435-51, bibl. 10.

e

KRAUS, E. J.

**Developing new clones of chrysanthemums.** *Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 15-24.

f

MOORE, W. C.

**Diseases of bulbs.***Bull. Minist. Agric. Lond.* **117**, reprinted 1949, pp. 176, bibl. 709, illus. [first published 1939].

g

MÜLLER-FEMBECK, J.

**Die echten Mehltaupilze auf Zierpflanzen. (Powdery mildew of ornamental plants [and its control].)***Flugbl. Bundesanst. PflSchutz, Wien*, **61**, 1949, pp. 1.

h

RILEY, H. P.

**Relationship of blue and orange flower-color types in *Nemesia strumosa*.***Bot. Gaz.*, 1949, **111**: 43-52, bibl. 13, illus.

i

WYMAN, D.

**Dwarf shrubs for low hedges.***Brooklyn bot. Gdn Rec.*, 1949, **5**: 132-5, illus.

## SUB-TROPICAL CROPS.

*General.*

(See also 1156, 1187, 1188, 1194.)

988. CHEEMA, G. S.

**Horticultural industry in India.***Indian Fmg*, 1949, **10**: 1-3.

The present production of fruits and vegetables in India falls far short of requirements, a situation which has been intensified by the loss of important citrus and temperate fruit areas to Pakistan. There is a horticultural tradition in the country and research has made notable strides, but a much greater effort should be made in the future. In particular there is a need for a central co-ordinating organization, for more trained men for both research and extension work, and for experimental stations devoted to basic horticultural problems.

989. RICHARDSON, A. M.

**Horticultural districts in Queensland. 2. The Lockyer Valley.***Qd agric. J.*, 1949, **69**: 279-84, illus.

The Lockyer Valley, about 40×10 miles in area, lies between the coastal ranges and the main Divide which passes through Toowoomba. An account is given of its climate, soils, vegetation, horticultural uses (cultivation of citrus, vines, tomatoes, melons, vegetables), horticultural production (statistics), and market outlets. There is still room for much horticultural expansion.

990. NESTERENKO, G.

**Subtropical culture in new regions. [Russian.]***Kolhoznoe Proizvodstvo* (Collective farming), 1949, No. 1, pp. 26-7.

The possible extension of the cultivation of subtropical fruits, e.g. lemon, orange, mandarin, fig, pomegranate, persimmon, olive, and eucalyptus, in southern Russia is discussed, with particular reference to dwarf trees, prostrate trees, wall culture, and growing lemons and oranges under removable coverings.

991. ABDULLAEV, A. G.  
**Subtropical fruitgrowing in Azerbaidžan.**  
 [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1949,  
 No. 12, pp. 40-4, illus.

The soil and climate in the southern foothill regions in Azerbaidžan (Azerbaijan S.S.R.) are suitable for growing subtropical fruit and timber trees. The climate of the various regions and their suitability for special crops are described. The persimmon is not exacting as to soil and grows satisfactorily in all moist, semi-moist and arid zones. The pomegranate is not specially exacting and usually grows well, particularly in the drier regions. The almond grows well and is fruitful in most regions. The fig does not thrive and is less winter hardy than the pomegranate and persimmon. Trials are now being made with the object of extending the areas under tea, eucalyptus, citrus, olive, tung, etc., into higher and less mild, subtropical regions.

### *Citrus.*

(See also 495, 497, 1192, 1195, 1196.)

992. BLONDEL, L.  
*L'agriculture marocaine.* (Citrus  
 growing in Morocco.)  
*Rev. hort. Algér.*, 1949, 53: 59-68, reprinted  
 in *Rev. int. Bot. appl.*, 1949, 29: 524-31.

A note on the cultivation of olives, almonds, figs, dates and apricots grown either on a small scale or without particular attention [as in the case of olive] in Morocco is followed by a rather more detailed account of the areas devoted to particular types of citrus, the varieties used, the methods of cultivation adopted, and the industrial progress in citrus growing in Morocco which appears to be imminent.

993. HAYES, W. B.  
**The citrus industry in Sikkim.**  
*Indian J. Hort.*, 1945, 3: 49-55, bibl. 2  
 [received 1949].

The citrus industry in Sikkim is small but important to the economy of the State. It is based almost entirely on the mandarin or suntala orange with a few sweet oranges, grapefruit and limes. Problems that require attention are methods of propagation, trees at present being generally raised from seed; the failure of trees to thrive at altitudes below 2,000 feet; and, particularly, the control of fruit flies and stem borers.

994. READ, F. M.  
**Citrus growing in California.**  
*J. Dep. Agric. Vict.*, 1949, 47: 529-42,  
 illus.

An account of observations made by the author during a visit in 1948 to the United States and to the Riverside Experiment Station in particular, with notes on non-tillage, irrigation, general health of trees, rootstocks, nucellar buds, "quick decline", pest control

spray equipment, fumigation including tent pulling, biological control and frost control.

995. BHATTACHARYA, S. C., AND DUTTA, S.  
**The cultivation of oranges and allied fruits in Assam.**  
*Publ. (Fruit Series) Dep. Agric., Assam*, 5,  
 1949, pp. 21.

There is room for considerable expansion of citrus fruits in Assam, and this booklet summarizes the knowledge acquired to date and provides a guide to growers who may wish to extend their groves. Points of general interest are: *Soils*: Analyses are tabulated for 5 typical soils in the orange belts of the province; contrary to accepted belief the fact that they are slightly acid is considered an advantage. *Altitude*: The loose-skinned Khasi orange, *C. reticulata*, grows well in areas above the plains up to 1,500 feet; above this, fruit quality deteriorates. Limes and lemons appear to do best between 150 and 800 feet. *Varieties*: There are two distinct varieties of *C. reticulata*, the Khasi ripening October-February, and a much less common variety ripening March-May. These are superior to any of the other mandarin oranges grown in India. Other species represented are: Shaddocks, from which white fleshed and pink fleshed varieties have been selected; limes, *C. aurantifolia*, of which there are two distinct varieties, an oval and a round; lemons, the best of which is a variety known as Assam-lemon that compares favourably with imported varieties, and unlike them is fairly resistant to scab; sweet oranges and grapefruit are of recent introduction. *Propagation*: Seed is the commonest method, the Khasi orange showing a high degree of polyembryony. Vegetative propagation is, however, to be preferred. As rootstocks for Valencia and Mosambi sweet oranges and for Khasi mandarin orange two lemons are recommended as a result of prolonged trials, the Soh-Myndong (rough lemon) and the Kata-Jamir or Tulia Tenga (smooth round lemon). Stocks for lime and lemon have not been determined and the present method of propagation by "gootee" (marcottage) should be continued, or both species should be raised from cuttings. Methods of propagation are described. *Other aspects*: Those discussed are layout and planting, cultivation, manuring, picking, packing, and diseases and pests. Among diseases, mention is made of "foaming" or "weeping" of the bark of Khasi oranges only, which appears to be caused by a *Fusarium* associated with the *Phytophthora* which causes gummosis.

996. BAIN, F. M.  
**Citrus and climate.**  
*Calif. Citrogr.*, 1949, 34: 382, 412-14, 426,  
 448-9.

Comparison is made between the behaviour of citrus in southern California and Trinidad, areas which represent the two extremes of climate under which this crop can be economically cultivated. *Main differences observed*: Trinidad citrus has a much higher rate of growth than Californian. It takes a shorter time from flowering to maturity, and has more juice but less colour. The Washington Navel orange is inferior in Trinidad, but the Marsh grapefruit is superior. While in California granulation is a problem with the Valencia but not the Washington Navel, the



reverse is true in Trinidad. *Rate of growth in relation to heat units:* It has been shown experimentally by Webber that citrus stops growing at temperatures of 54° F. and lower and at temperatures above 97° F. The application of Webber's system of heat units above 54° F. that are available during the growing period shows Trinidad with 6,560 units compared with California: Imperial Valley 6,078, Riverside 3,209 and Oakland 1,186. Moreover, in Trinidad temperatures do not exceed 95° F., while in California temperatures much in excess of 97° F. occur, and in Trinidad some 2,500 heat units are also available during the usual dormant season. *Fruit maturity:* In California fruits take 7 months or more to reach maturity, and in the cooler areas will be carried over the winter into the following summer. In Trinidad they take 3½ to 7 months. The heat units used are, however, the same in both countries, about 2,800 for Washington Navel and 5,500 for Marsh grapefruit; this explains why Marsh in the cooler parts of California cannot complete its maturity in the one season. *Fruit colour:* It appears that a period of dormancy is essential to produce good colour; this develops from the breakdown of chlorophyll during the dormant period. With Washington Navel, which ripens green in Trinidad, maturity is reached earlier while the trees are in full growth and chlorophyll formation is proceeding actively. With Valencia, fruits colour in both countries, but the colour obtained is better in California, suggesting that lowered temperature is an additional factor in the dormancy period. *Juiciness:* The superior juiciness of Trinidad fruit is not related to moisture but to relative humidities exceeding 70% during the growing season compared with much lower humidities in California. *Granulation:* Granulation occurs in Washington Navel maturing in Trinidad in the growing season following blossoming, and in the Valencia in California in the growing season following dormancy. It is more pronounced in trees grown on vigorous rootstocks such as rough lemon or "wild grapefruit". *Dormancy:* Dormancy is induced by low temperatures and by withholding water during the growing season in California but by dry weather in Trinidad where, however, it can be shortened by applying irrigation water. Dormancy appears to be an essential prelude to blossoming, and the longer the period the greater the amount of flowering. *June drop:* Webber relates this in California to high temperatures and dry atmosphere, but this cannot apply to Trinidad. In the latter it has been observed that the longer the dormant period, the greater the flowering and the greater the shedding of fruit. Shedding appears to be related to an insufficiency of carbohydrate. *Cropping versus growth:* In a part of Trinidad with rainfall varying from 50 to 90 inches a positive correlation was found between amount of growth and rainfall but a negative correlation between cropping and amounts of rainfall and growth. Reduced growth in dry years varied with different combinations of stocks and scions, but was particularly pronounced with sweet oranges on sour orange stocks. *Fertilizers:* Trees in California appear to need twice as much nitrogen as trees in Trinidad; this is probably related to the longer hours of sunshine in the former, and to the fact that California trees flower while still carrying the previous crop.

997. TAI, E. A.

*Expansion of the Jamaica citrus industry.*  
*Ext. Circ. Dep. Agric. Jamaica* 31, 1949,  
pp. 15, bibl. 12, illus.

The steps that are being taken in Jamaica to increase citrus production, both by encouraging better orchard management in existing groves and by extensive additional plantings of approved varieties, are described, and information is given on the services available to growers.

998. CHEVALIER, A.

*Nouvelles observations sur quelques Auran-  
tiacées africaines. (New observations on  
some African Aurantiaceae.)*  
*Rev. int. Bot. appl.*, 1949, 29: 472-80,  
illus.

Since writing a previous article on this subject noted in *H.A.*, 19: 1607a, the author has studied the work by W. T. Swingle, "The Botany of Citrus and its wild relatives of the Orange sub-family" [which forms chapter 4, pp. 129-474 of the *Citrus Industry*, Vol. 1, by Webber & Batchelor, *H.A.*, 14: 946]. Descriptions, complementary to those given by Swingle, are given for 4 species of *Aeglopsis* and 2 of *Afraurantium*. The latter and two of the former are considered to be new species and are illustrated.

999. ROSS, A. A.

*The origin of the Ellendale mandarin and its  
relatives.*

*Qd agric. J.*, 1949, 69: 222-4, illus.

A short account of the early history of the Ellendale mandarin in Queensland where it is now extensively grown.

1000. METLICKÝ, L. V., AND CEHOMSKAJA, V. M.

*The vitamin C content of citrus fruits as an  
indication of their resistance to decay in  
storage.* [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 69:  
659-61.

Data presented show that a high ascorbic acid content of citrus fruits determines their resistance to physiological breakdown during storage. It is considered, therefore, that selection of new varieties for high vitamin content will yield forms with an increased storage life.

1001. SINGH, M. P., AND KUNTE, Y. N.

*Composition of juice from Santra halves.*  
*Indian J. Hort.*, 1949, 6: 2: 11-20, bibl. 8.

Differences between the stem and stylar ends of segments of the loose-skinned Santra orange, as suggested by taste, were confirmed by analysis of halved fruits picked at three different periods.

1002. LI, L. Y., AND LI, C. S.

*Blooming of the orange, lychee and lungan  
trees during the winter of 1948 in Foochow.*  
[Chinese, English summary 2 pp.]

*Fukien agric. J.*, 1949, 10: 163-8, bibl. 8.

Whereas oranges, lychees and lungan normally bloom in Foochow in the period March-May, trees of all three species were found to be blooming in December 1948. This was associated with an unusually high mean

winter temperature of 56-9° F. for December, January and February compared with 20-year means of 57-2° F. for March and 64-9° F. for April. It is noted that this mean winter temperature is above the vital, or minimum temperature at which citrus will grow, which is reported in the U.S.A. to be 55° F. The vital temperature for lychee is reported from Florida to be 60°-65° F.; but, although this is above the mean winter temperature, there were days during the winter with temperatures in excess of 65° F. [From English summary.]

1003. CHOUDHURY, S. D., BHATTACHARYA, S. C., AND DUTTA, S.  
**Cultivation of Assam lemon.**  
*Indian Fmg*, 1947, 8: 554-6, illus. [received 1949].

The authors point out the desirability of developing the lemon industry in Assam on a commercial scale. Indigenous and foreign varieties of lemon have recently been studied at the Citrus Experiment Station at Burnihat, Assam, with the purpose of finding suitable commercial varieties. From a local variety a strain known as Assam Lemon has been selected and is highly recommended to growers. It is hardy, prolific, and appears to be immune to scab (*Sphaceloma fawcettii*) to which Eureka and Genoa lemons are susceptible under Assam conditions. A detailed description of the lemon is given, together with directions for its cultivation.

1004. CHOUDHURY, S. D., BHATTACHARYA, S. C., AND DUTTA, S.  
**Valencia orange holds out a promise in Assam.**  
*Indian Fmg*, 1947, 8: 454-6, illus. [received 1949].

Valencia and Washington Navel oranges were introduced into Assam some 20 years ago but their cultivation did not expand, probably because the only rootstock used was a wild type of *C. grandis* on which neither orange thrived. More recently, trials at Burnihat have shown that Valencia grows well on several varieties of *C. limonia* of which the Soh Myn-dong (Rough Lemon) is now recommended. It is considered that this orange will soon become firmly established on a commercial basis in Assam and the greater part of the article is concerned with suggestions on its cultivation, manuring, etc.

1005. BHATTACHARYA, S. C., AND DUTTA, S.  
**A cultural experiment with Khasi orange (*Citrus reticulata*) trees in Assam.**  
*Indian J. Hort.*, 1949, 6: 2: 6-10, bibl. 9.

The material consisted of a uniform, uncultivated grove of 25-year-old seedling Khasi orange trees growing on alluvial soil. Yield records were made in 1940 and 1941, and a replicated "care" versus "no care" experiment carried out in 1942. The "care" plots received two light hoeings, three weed brushings, one spray application of 4:4:50 bordeaux mixture and a coat of lime wash on the trunks as a protection against sun-burn. The "no-care" plots received only one cutting of the undergrowth prior to harvesting in accordance with local practice. The treatments applied

to the "care" plots resulted in a significant increase in yield.

1006. NANDI, H. K., BHATTACHARYA, S. C., AND DUTTA, S.  
**Investigations on some fundamental aspects of citrus propagation in Assam.**  
*Indian J. agric. Sci.*, 1945, 15: 191-200, bibl. 20 [omitted in error from H.A., 16].

The series of studies described in this paper may be summarized as follows: *Polyembryony*.—Seven varieties in 5 species including the locally important Khasi orange, *C. chrysocarpa*, produced more than one seedling per seed; shaddocks and citrons, however, appear to be mono-embryonic. *Germination of seed in relation to maturity of fruit*.—Seeds from mature Khasi orange germinated better than those from immature fruits; overripening lowered viability only slightly but prolonged the period of germination considerably. *Effect of sun-drying on germination*.—Best and quickest germination was obtained with fresh Khasi seed; this deteriorated progressively with longer periods of sunning, becoming nil after 36 hours. *Duration of viability*.—Seed of several species kept for up to 2½ months in a desiccator showed progressive reduction in viability with length of storage; larger seeds remained viable the longest. *Propagation by root-cuttings*.—Citrons and lemons showed successes ranging from 12% to 68% according to size of cutting; shaddocks, sour orange, Khasi orange and *C. macroptera* failed to form shoots. *Propagation from stem cuttings*.—Treatment with Hortomone A improved rooting and also apparently shoot growth in citrus varieties that root naturally from cuttings; it did not induce rooting in the Khasi orange. *Propagation by marcottage*.—"Gootee" or marcottage was tried with 10 varieties representing 8 species; percentage rooting exceeded 70% in all cases, although the time taken varied considerably in the different varieties. *Propagation by bark-grafting*.—The system described appears to be side grafting, and was tried with Khasi orange as scion and a lemon as stock during the wet season, June to August, when budding gives poor results. The method was successful in periods of continuous wet weather, but failed completely after August when drier weather ensued. *Propagation by budding*.—Trials of shield budding Khasi orange on a lemon variety showed negligible difference between T and inverted T insertions; leaving wood adhering to the bud-shield, however, gave better results than removing it. Best results were obtained in the winter months November-January, with September and February the next best; bud break in the Khasi scion took 49 to 62 days but showed no distinct seasonal influence. Cutting back the stocks at the time of budding to 6 inches above the bud caused serious injury to many stock plants and lowered the percentage of bud "take". Progressive cutting back to the bud is safer and produces satisfactory extension growth of the bud.

1007. BITTERS, W. P.  
**Dwarfing citrus rootstocks.**  
*Calif. Citrogr.*, 1949, 34: 516-17, 539-43, bibl. 5, illus.

Between 1927 and 1933, six scion varieties, Eureka and Lisbon lemons, Marsh Seedless grapefruit, Valencia and Washington Navel oranges and Owari Satsumas,



were planted out, each on about 35 rootstocks, the total number of rootstocks used being over 60. Trunk area cross section measurements (ACS), as a guide to size, and yield figures for various combinations are tabulated with comparative figures for the same varieties on sweet orange stocks. The following stocks are described: (1) Trifoliate orange, *Poncirus trifoliata*, shows various strains, some dwarfing in effect and others not. Using a dwarf strain, trees of grapefruit and sweet orange are healthy at 20 years old, but show less than half the ACS of trees on sweet orange, and have yielded good crops of high quality. Satsumas up to 8 years old and Kumquats up to 21 years have also done well, but Eureka lemons have been unsatisfactory, all trees developing exocortis disease on the trifoliate roots. (2) *Severinia buxifolia*, the box orange, also contains several varieties and can be propagated by seed or cuttings. With the variety used here as a stock, there has been a distinct dwarfing effect. Sweet oranges have survived for 20 years, but have become chlorotic with declining yields; grapefruit and lemons have done better. (3) *Palestine sweet lime*: Compared again with trees on sweet orange stock there has been a distinct dwarfing effect. Yields of grapefruit and two sweet oranges, though fairly good in the first ten years, have been proportionately lower than from trees on sweet orange in recent years. Only with Eureka lemon trees have yields continued to increase proportionately. The value of this stock in California is doubtful, because it is more sensitive to cold than other stocks and is very subject to gummosis. (4) *Cuban shaddock*, an apparent shaddock  $\times$  lemon hybrid, produces somewhat smaller trees of grapefruit, sweet orange and Eureka lemon than does sweet orange but is subject to foot rot and cold injury, and the scion fruit is of poor quality. (5) *Savage citrange* (trifoliate  $\times$  sweet orange), with grapefruit and satsuma scions, and (6) *Morton citrange*, with Washington Navel and satsuma scions have produced high yielding trees with ACS 55% to 91% that of comparable trees on sweet orange stock. (7) *Other citranges*: Troyer, recently included in trials, appears very promising, but others like Rusk, Coleman and Cunningham produced dwarfed but unhealthy trees. (8) *Eureka lemon from cuttings*, used as stocks for Valencia, produced dwarf trees, but with relatively low yields and poor fruit quality.

#### 1008. NESTERENKO, G.

Preparing for citrus planting. [Russian.]  
*Kolhoznoe Proizvodstvo* (Collective farming),  
 1949, No. 3, pp. 29-30.

An account is given of plans for extending citrus culture in U.S.S.R. from the most southerly regions to others farther north, where the plants may require special treatment especially with regard to protection from frost and cold winds. For about two years, until the new regions have established their own nurseries, the material for planting will have to be obtained from the Georgian S.S.R. A rootstock, suitable for citrus culture in the moist subtropical Caucasian coast of the Black Sea, is *Poncirus trifoliata* because of its frost resistance, but in the more alkaline and drier regions it does not thrive, and bitter and sweet oranges should be used instead. Only lemons can be successfully propagated from cuttings, but the trees are not fruitful and only suitable for growing in tubs.

#### 1009. SAMISCH, Z., AND COHEN, A.

Composition of oranges in Israel. [English and Hebrew.]

*Bull. Rehovot agric. Res. Stat.* **51**, 1949, pp. 115 [English pp. 57], bibl. 42.

Over 90% of the oranges in Israel are of the Shamouti [Jaffa] variety, 70-80% of these being grown on sweet lime rootstocks and the remainder on sour orange. Valencia oranges, generally budded on sour orange, comprise under 10% of the total. The investigations, described here were carried out over three successive crop seasons, and provided means of determining the effects on physical characteristics and composition of the fruit of such factors as soil, rootstock and time of harvesting, as well as changes in composition during storage. For the Shamouti orange results may be summarized as follows: Average weight of mature fruit 233 g., width to length ratio about 0.87, peel 6.9 mm. thick, juice content 43% with, at mid-season, an average of 10.7% total soluble solids including 8.01% total sugars, 1.07% citric acid and about 47 mg. ascorbic acid per 100 ml. juice. With juice, reamed and sieved as in industrial practice, the greenish tinge disappears in November, though bitterness is still discernible until late December; the brightness of the juice fades to some extent towards the end of March. During the course of maturation the fruit increases in size and volume until almost the end of the season; the amount of reamable juice increases up to mid-January and then decreases; the peel increases constantly in thickness throughout the season. Soluble solids in the juice increase from about 9% up to 12% during the course of the season, total sugars being constantly 2% to 3% lower, and acidity declines uniformly from about 1.5% citric acid in November to less than 0.8% in April. Analyses of the "peel and rag" left after the juice was extracted are also given. Valencia oranges compared with Shamouti weigh about 20% less, have thinner peels and higher contents of juice, ascorbic acid, citric acid and essential oil; soluble solids and sugar contents are similar, but Valencia juice contains proportionately less monosaccharides and more disaccharides. Variability between fruits on a single tree was greater than that between representative samples from different trees. Fruit from different groves showed considerable differences throughout a season but these differences were not always similar in different seasons. Soil effect could not be clearly established, but rootstock was shown to affect fruit composition; comparing sweet lime and sour orange, the latter was found to give superior juice containing about 10% more sugar, 18% more citric acid and more ascorbic acid. Juice from trees grown on sweet lime and inarched subsequently with sour orange was intermediate. Correlations were established between pH and citric acid, soluble solids and sugar content, and between size of fruit and peel thickness and essential oil content; size of fruit was inversely related to carbohydrate and citric acid contents. Storage of juice for 28 days at room temperature in January had very little marked effect on composition, but in fruits stored in March there was a marked reduction in fruit juice components. Practical considerations for the citrus products manufacturer are discussed in the light of these results.

## 1010. KATYAL, S. L.

**Studies on seed formation, embryo development and pollen germination in Morton citrange.**

*Indian J. Hort.*, 1949, 6: 2: 21-30, bibl. 14.

The studies described here were carried out at the University of California. The hybrid Morton citrange (trifoliate orange  $\times$  sweet orange) is of value as a potential rootstock, but produces too few viable seeds to be satisfactory. Among the tentative conclusions drawn are the following: 70% of the flowers are staminate, these unisexual flowers having less viable pollen than perfect flowers. Pollen germination tests showed that the most favourable conditions of a 10% sugar solution and controlled temperature of 78-80° F. produced 15.6% germination; among 10 other citrus varieties the highest under the same conditions was citron with 25.1%. Average length of pollen tube growth of the citrange was 4.5 mm. compared with 5.5 mm. for Duncan grapefruit, which explains the seedlessness in a majority of citrange fruits. Cross-pollinating citrange with Ponderosa lemon produced 70% to 80% more seeds than self-pollination. Marked polyembryony was found in citrange fruits, the average number of embryos in well filled seeds being 24, and the maximum 70. Seed germination occurring up to 40 days ranged from 0% to 50%, which is much lower than in other citrus varieties.

## 1011. CHAPMAN, H. D.

**Tentative leaf analysis standards [for oranges].**

*Calif. Citrogr.*, 1949, 34: 518.

A table, with an explanatory note, is given showing the inorganic composition of orange leaves associated with, or suggestive of, mineral deficiencies or excesses, and the range of values found in high-performance California orchards. The elements listed are N, P, S, Ca, Mg, K, Fe, Mn, Zn, B, Cu, Mo, Na, and Cl. The effect of a deficiency of any one element on the other elements, where this is known, is also indicated as an increase or decrease.

## 1012. BHATTACHARYA, S. C., AND DUTTA, S.

**A manurial trial with Khasi orange trees in Assam.**

*Indian J. Hort.*, 1944, 3: 30-7, bibl. 6 [received 1949].

The loose-skinned Khasi or Sylhet orange, *Citrus chrysocarpa* Lushington, is the most important commercial citrus species in Assam. The trial described here was carried out in a seedling grove. It had to be abandoned before significant results were obtained.

## 1013. JONES, W. W., AND PARKER, E. R.

**Application of urea to foliage of orange trees.**

*Calif. Citrogr.*, 1949, 34: 463, bibl. 2.

Spraying urea in concentrations up to 15 lb. per 100 gal. water on to leaves of Washington Navel and Valencia oranges caused no damage and resulted in appreciable increases in the N content of leaves, in cases where N was deficient. Further research is needed, however, to determine the value of the operation.

## 1014. ALDRICH, D. G., AND HAAS, A. R. C.

**Response of lemon trees to phosphorus and potassium.**

*Calif. Citrogr.*, 1949, 35: 5, 22-4, bibl. 8, illus.

Leaf symptoms previously described by Haas (*H.A.*, 19: 2393) as indicative of a low K content in citrus trees in the field are now known to involve both a low K and P content. This conclusion is based on several trials in which Eureka lemon trees were injected with solutions containing 200 g. di-potassium phosphate in 3 litres water, and solutions containing P and K alone. Leaf samples analysed one week after November injections of the composite solution showed K nearly doubled and P nearly trebled. Growth response both in quantity and quality was marked and was greater than from either P or K injected separately. The trials have provided further evidence that the rootstock influences the amount of P and K in the leaves.

## 1015. HUBERTY, M. R., AND PEARSON, H. E.

**Irrigation of citrus orchards with waters of different chemical characteristics.**

*Calif. Citrogr.*, 1949, 34: 515, 535, bibl. 5.

A progress report is given of two orange orchard trials over 6 years in which water from 3 sources has been used for irrigation. Water characteristics and cultural practices are described and yields tabulated. So far no apparent differences in tree vigour have appeared and changes in yield have been very slight, but measurable differences are beginning to appear in the physical and chemical characteristics of the soil.

## 1016. WANDER, I. W.

**An interpretation of the cause of water-repellent sandy soils found in citrus groves of Central Florida.**

*Science*, 1949, 110: 299-300, bibl. 6.

During the rainy seasons of 1947 and 1948 at the Citrus Experiment Station, Florida, differences in the prevalence of water-repellent soil were noted in a group of plots that had been given different fertilizer treatments. The treatments had been operative for 10 years. Determinations of the relative amounts of water-repellent soil in each plot indicated that the use of magnesium in the fertilizer, together with applications of ground limestone, was associated with the water-repellent phenomenon. A chemical investigation of the soils showed the presence of fatty acids which, on the addition of dilute calcium or magnesium hydroxide, caused wettable soil to become very water-repellent when dry. From the results of careful experiments it is concluded that the water-repellent property found in many Florida citrus soils is caused by the formation of a water-repellent coating of metallic soaps on the soil particles. The source and identity of the particular fatty acids involved have not yet been determined.

## 1017. CURTIS, D. S.

**Nitrite injury on avocado and citrus seedlings in nutrient solution.**

*Soil Sci.*, 1949, 68: 441-50, bibl. 12, illus.

There was no appreciable accumulation of nitrites except in solutions containing N as  $\text{NO}_3$ . With  $\text{NO}_3$  available, nitrites increased as a result of the presence of avocado seedlings and the addition of organic matter (oatmeal). Seedlings withstood increasingly higher



concentrations at higher pH levels. Avocado seedlings were more severely injured than citrus seedlings and showed less ability to recover from injury and produce new root growth after treatment.

1018. SMITH, R. J.

**Damage to citrus fruit in bulk handling.**

*Calif. Citrogr.*, 1949, 34: 425, 445-7, bibl. 1 in text.

Tests were made with Valencia oranges and lemons to determine if bulk handling in the field, which saves labour, increased the amount of damage to the fruit. For bulk handling, boxes 22 inches deep and holding about 4 times the amount of fruit held by ordinary field boxes were used. The development of mould on fruits from different layers in the two types of container was used as an indication of damage. The results showed no increase in damage from the use of large containers.

1019. McALPIN, D. M., AND MERRETT, D. C.

**To stop winter drop of grapefruit.**

*Orchard. N.Z.*, 1949, 22: 4: 16-17.

Heavy winter drop of grapefruit has been controlled in Victoria with 2,4-D at 22 p.p.m. plus summer white oil as spreader and sticker, applied in May when autumn growth has ceased. Good results have also been obtained with the same spray in reducing pre-harvest drop of lemons and oranges. [See also *H.A.*, 19: 1487.]

1020. HAAS, A. R. C.

**Cold injury in citrus leaves.**

*Calif. Citrogr.*, 1949, 35: 49, bibl. 3, illus.

Low temperatures during the winter of 1948-49 produced leaf symptoms that superficially resembled the patterns found in leaves that were low in potassium, phosphorus or both. Photographs of cold-injured lemon and orange leaves show large areas of chlorophyll-bearing tissue destroyed, the presence of small scattered gum spots and occasional dry or cork-like areas.

1021. ANON.

**Notes on orchard heating.**

*Calif. Citrogr.*, 1949, 35: 48.

Notes based on information supplied by the Californian Agricultural Extension Service, with special reference to citrus.

1022. DuCHARME, E. P., AND KNORR, L. C.

**Relation between Argentina's "lepra explosiva" and "Florida's scaly bark" of citrus.**

Abstr. in *Phytopathology*, 1950, 40: 7.

Field comparisons in Argentina and Florida reveal such fundamental similarities with respect to symptoms on bark, fruit, and leaves as to lead to the conclusion that lepra and Florida scaly bark are synonymous. The adoption of the name "leprosis" is urged.

1023. SCHNEIDER, H., WALLACE, J. M., AND DIMITMAN, J. E.

**The pathological anatomy of bud-union tissues of orange trees and its value in the diagnosis of quick decline.**

Abstr. in *Phytopathology*, 1950, 40: 24.

In orange trees showing the non-specific top symptoms of quick decline, radial sections disclose a series of

changes in the phloem at the bud union. These changes are described; and it is concluded that anatomical analysis is of value for rapid indexing of suspected trees, particularly for quarantine purposes. Used with other symptoms it is a practical substitute for the more exacting bud transmission test which requires many months.

1024. SCHNEIDER, H.

**Seasonal and cyclic variation in amount of phloem necrosis in lemon trees affected by decline.**

Abstr. in *Phytopathology*, 1950, 40: 24.

Trees with phloem-necrosis, growing on sweet orange stock, do not deplete their reserve starch as readily as those on grapefruit stock, but they may go into a mild decline with some starch present in the roots. In general, necrosis is most extensive in spring, but cycles of extensive unseasonal necrosis may occur any time.

1025. ADAM, D. B., AND OTHERS.

**The estimation of latent infection in oranges.**

*Aust. J. sci. Res., Ser. B, biol. Sci.*, 1949, 2: 1-18, bibl. 9, illus.

The investigations described here were started in 1939 at the Waite Agricultural Research Institute, University of Adelaide. The authors discuss their results as follows: "The objective of a wider investigation, of which this is the initial part, is to elucidate the role which infection by *Colletotrichum* plays in the development of the spotting which occurs in oranges after a period of cool storage. In the first instance, we wanted to ascertain the extent to which different parts of the orange or different groups of oranges might vary in respect to their infection, a fact which is complicated in oranges by the phenomenon of latency.

"The results reveal that considerable variations in the degree of infection may occur and that it is possible to give a numerical expression to the prevalence of infection in different parts of the orange, in oranges from different trees and from different districts, and in oranges from the same trees in different seasons.

"The significant differences in the infection of oranges picked at the same time from different trees in the same orchard suggest either that inoculum is more abundant on some trees than others or that oranges from some trees are more susceptible than those from others. At this stage it is not possible to present clear-cut evidence in favour of either one of these alternatives but for our purposes the material fact lies in the existence of the differences.

"Considerable differences in infection may also occur between oranges taken from the same trees in different seasons, in oranges from different districts, and according to the time when oranges are picked for sampling. These differences, coupled with the absence or low degree of infection occurring in oranges, protected from rain, all point to the importance of weather in determining the degree of infection. However, there are not sufficient data available to indicate the relative importance of the various elements that together constitute the weather. In South Australia it is to be noted that the first significant increase in infection occurs naturally in April or May when the rains of autumn usually commence. Spray treatments with bordeaux mixture reduce the degree of infection but

*Avocados and other fruits.*

the extent of reduction is dependent on times of application. Information was gained from trials where only a limited number of the possible times of application were used. Where the degree of infection was light a single application in April was relatively effective but where conditions for infection are more favourable additional later sprays appear to be necessary for really efficient control."

## 1026. SPERONI, H. A.

La podredumbre de naranjas dulces causada por los mohos verde y azul en Concordia (Argentina). (A rot of sweet oranges caused by green and blue moulds observed in Concordia (Argentina).)

Rev. argent. Agron. B. Aires, 1949, 16: 244-50, illus.

In 1943 fruit in a grove of sweet oranges at the Colonia Yeruá Experiment Station, Entre Ríos, was severely attacked by the green and blue moulds, *Penicillium digitatum* and *P. italicum*. These had previously been reported only as moulds of fruit in storage and transit. Varieties differed considerably in their susceptibility to attack, Lue-Gim-Gong being highly susceptible and Jaffa completely resistant. Symptoms of infection and the development of the disease are described. It is thought that the fruit was predisposed to attack that year by the irregularity of rainfall that made the rind soft, and by an attack of "fruit fly" that injured the skin and provided a ready entry for the fungus. Neither picking off the diseased fruit nor dusting with 1% bordeaux mixture controlled the disease. Control of the "fruit fly" is recommended as a preventive measure.

## 1027. CIFERRI, R.

A decline of citrus plants in Venezuela.

Nature, 1950, 165: 32, bibl. 1.

A survey of citrus groves in Venezuela led the Italian pathologist to the conclusion that the decline of citrus trees in that country is primarily due to a disease similar to tristeza.

## 1028. OSBURN, M. R.

Tests of parathion for control of the little fire ant.

J. econ. Ent., 1949, 42: 542, bibl. 4.

The little fire ant (*Wasmannia auropunctata*) is an important pest to workers in citrus and guava groves in southern Florida, and may make picking very difficult. In tests with parathion for control of this ant, all treatments were significantly better than the checks but none would be considered satisfactory from the standpoint of the worker for more than a few weeks. 1 lb. of 25% wettable powder per 100 gal. water sprayed over the entire tree, or 2 lb. sprayed over the trunk only, gave satisfactory control for 8 weeks.

## 1029. MINATTA, M. J., AND KING, J. R.

Control de la cochinilla roja Australiana. (Control of the Australian red scale.)

Bol. Minist. Agric. Estac. exp. citric. Concordia [Argentina] 1, 1949, pp. 3.

A programme for spraying trials for 1949-50 with mineral oil against the citrus red scale, *Aonidiella aurantii* Mask.

## 1030. EBELING, W.

Control of avocado pests.

Calif. Citrogr., 1949, 34: 424, 444 and Yearb. Calif. Avocado Soc. 1949, pp. 104-9.

The pests described are: (1) The greenhouse thrips, *Heliothrips haemorrhoidalis*, can be controlled by spraying with 1½ to 2 lb. 50% DDT wettable powder per 100 gal., plus 1 lb. wettable sulphur where it is also desired to control brown mite, *Paratetranychus coiti*; sulphur should not, however, be applied on days when temperatures as high as 84° F. are expected or damage to the trees may result. (2) The long-tailed mealy bug, *Pseudococcus aonidium*, occasionally attacks avocados, especially newly grafted scions; controllable with DDT as above. (3) The omnivorous looper, *Sabulodes caberata*, may occasionally cause defoliation, but responds to spraying with DDT. (4) The catania scale, *Aspidiotus destructor*, formerly the principal pest of avocados, but now of negligible importance as the result, apparently, of natural enemies. (5) Various beetles which feed on the foliage can be controlled with 5% DDT dust. (6) The chinch bug, *Nysius ericae*, and Argentine ants; controlled with 5% chlordane dust. (7) Species of ambrosia beetles, boring holes in the limbs, can be killed by painting infested surfaces with DDT fly spray. (8) Snails and rats are also mentioned.

## 1031. CHAPOT, H.

Le thrips des serres (*Heliothrips haemorrhoidalis* Bouché) sur agrumes et avocats au Maroc. (The thrips, *H. haemorrhoidalis*, on citrus and avocados in Morocco.)

Fruits d'outre-mer, 1949, 4: 340-1, illus.

First recorded on citrus in Morocco in 1947 (*H.A.*, 18: 611), the pest is now abundant on avocados in the neighbourhood of Rabat. While thick-skinned types are not affected, varieties with thin skins like Fuerte are badly attacked and the fruit rendered unsaleable.

## 1032. GALLEGO, M. F. L.

Estudios entomológicos. (Entomological studies.)

Rev. Fac. nac. Agron. Colombia, 1949, 9: 121-34, illus.

The life histories, damage and control of *Hemiceras cadmia* and *H. velva*, lepidopterous pests of the "guamos" shade tree in coffee plantations, *Turuptiana obliqua*, the caterpillar of the avocado moth, and *Heilipus lauri*, the avocado seed borer.

## 1033. FANG, C., CHOU, C.-Y., AND LI, L.-Y.

Studies in the variety and quality of lychee, *Litchi chinensis*, in Foochow. [Chinese, English summary 1 p.]

Fukien agric. J., 1949, 10: 111-16, bibl. 8, illus.

A preliminary survey during the summer of 1948 showed that there were 8 horticultural varieties of lychee under cultivation in Foochow, 3 of them being of negligible commercial importance. The physical measurements and characteristics of the fruit of the 5 main varieties are tabulated, as are the following chemical determinations: acidity, ascorbic acid,



reducing, inverted and total sugars. Of the varieties studied, the Yuan-Hung is superior in quality, the Shan-Chi has the least flesh and relatively high acidity, sugars and ascorbic acid, but is particularly adapted to growing on hilly lands, while the Yen-Tzi is of poor quality. The two other varieties studied were the Kwei-Lin and Yen. [From English summary.]

1034. CHEN, L. H., YANG, S. L., AND CHOU, C.-Y.

**A preliminary survey of lungan, *Euphoria longana*, varieties in Putien, Fukien.**

[Chinese, English summary  $\frac{1}{2}$  p.].

*Fukien agric. J.*, 1949, 10: 147-54.

The characteristics, dates of maturity, etc., of 14 varieties of lungan found growing in Putien are tabulated [in Chinese]. Three with a high percentage of flesh, Hay-Lung-Ling, Pu-Ming-An and Tze-Kwei, are stated to be of high quality and are commonly used locally for drying purposes. Three others, Huang-Ker-Pun, Hay-Ker-Pun and Yiu-Tan-Pun, are common dessert varieties. Chu-Su-Pun, the earliest variety, is of poor quality. Chiu-Fen(g)-Pun and Hung-Her-Tze are late varieties. New-Chu-Pun, the 'bead' variety, has the smallest fruit, of inferior quality, but yields the heaviest crops. [From English summary.]

1035. NARASIMHAM, B.

**Influence of sex and parentage on the improvement of papaya.**

*Indian J. Hort.*, 1949, 6: 1: 22-9, bibl. 6.

In a review of the literature on sex determination, sex change and selection of papaya the author outlines the many problems that require elucidation before wastage due to excessive numbers of males and inferior types of females can be overcome.

1036. GANDHI, S. R.

**Factors governing stature and fruiting habit of the papaya.**

*Indian J. Hort.*, 1947, 5: 45-50, illus.

[received 1949].

Owing to its susceptibility to wind damage a short stem and low fruiting habit is desirable in papaya. Observations in Poona suggest that height is largely influenced by environmental conditions. Thus seedlings grown *in situ* produce taller trees than do transplanted seedlings. Transplanting during the August monsoon period results in the first fruit forming considerably higher up the stem than planting out in December or March. Transplanting should be done early when the plants are only 6-9 inches high, with all their leaves and roots intact and the tap root kept straight. In transplanting larger seedlings the practice of removing some of the lower leaves should be discouraged.

1037. SEN, P. K., GANGULY, B. D., AND MALLIK, P. C.

**A note on leaf-curl disease of the papaya (*Carica papaya* Linn.).**

*Indian J. Hort.*, 1944, 3: 38-40, bibl. 2, illus.

[received 1949].

Inoculation with sap from diseased plants produced disease symptoms in healthy plants when these were in active growth at the time of inoculation. The disease was not seed-borne. Disease symptoms also appeared in healthy plants subjected to waterlogging. Further studies are in progress.

## Other crops.

1038. GILLARD, S. O.

**The culture of chokos.**

*N.Z. J. Agric.*, 1949, 79: 373-5, illus.

Notes on the cultivation of *Sechium edule* with reference to suitable soils, the use of lime, preparing the ground and applying manures, cultivation, and harvesting.—Department of Agriculture, Auckland.

1039. GUTHRIE, J. D., AND OTHERS.

**Survey of the chemical composition of cotton fibers, cottonseed, peanuts, and sweet potatoes, a literature review.**

[Publ.] U.S. Dep. Agric., agric. Res. Administ., Bur. agric. industr. Chem. AIC 61, revised 1949, pp. 116.

The composition of the sweet potato is considered on pp. 79-106 and a list is given of 94 references to relevant literature.

1040. CARLTON, R. A.

**Sweet potatoes new venture for Indiantown, Fla., growers.**

*Market Gr. J.*, 1949, 78: 9: 10, illus.

The production of sweet potatoes for marketing between mid-May and mid-July, when the crop finds a ready market. The Louisiana type of sweet potato is grown. It is usually planted in January and February from slips taken from potatoes bedded in October or November.

1041. MCCLURE, T. T.

**Mode of infection of the sweet-potato wilt *Fusarium*.**

*Phytopathology*, 1949, 39: 876-86, bibl. 21, illus.

The principal mode of infection of sweet-potato sprouts by *Fusarium oxysporum* f. *batatas* is by way of vascular wounds such as freshly cut stems, roots, or fresh leaf scars.—Univ. California.

1042. NARAIN, R., AND DUTT, S.

**Chemical examination of the seeds of *Tamarindus indica*. No pectin in tamarind seeds.**

*Indian J. agric. Sci.*, 1945, 15: 209-13, bibl. 20, illus. [omitted in error from *H.A.*, 16].

The authors' work does not substantiate the finding of Ghosh and Krishna that tamarind seeds contained nearly 64% pectin in the dry weight. The kernel contains no pectin at all, but instead some 65.20% of starch. Other constituents are albuminoids 20.12%, oil 6.80%, reducing sugar 2.80%, crude fibre 2.43% and ash 2.45%. It is clear from these figures that the potential feeding value of the seeds is very high.

1043. KVARACHELIA, N. T.

**The effect of soil conditions on the development of the root system of tung (*A. fordii*).**

[Russian.]

*Doklady vsesojuz. Akad. sel'sk. Nauk S.S.S.R.*, 1950, No. 2, pp. 21-4, bibl. 8.

The distribution of tung roots just below the surface of the soil and their weak development indicates that they require good aeration and are sensitive to insufficiency

of nutrient substances. Too much moisture, interrupting the respiratory and nutritional processes, weakens the whole plant, and resistance to cold and fungal diseases is lowered. The roots die and then the parts above ground.

1044. GUTIEV, G. T.

**Frost resistance of the tung tree.** [Russian.]

*Doklady vsesojuz. Akad. sel'sk. Nauk S.S.S.R.*, 1950, No. 1, pp. 22-5, bibl. 8.

Observations in Trans-Caucasia showed that *Aleurites fordii* was much more frost-resistant than *A. cordata*. Young plants of *A. fordii* with good drainage and cultivation were not injured by temperatures of  $-9^{\circ}$ ,  $-10^{\circ}$ , or even  $-11^{\circ}$  C., which often kill similar plants of *A. cordata*. Mature trees of *A. fordii* can withstand temperatures of  $-12^{\circ}$ ,  $-13^{\circ}$ , and occasionally  $-14^{\circ}$  C. when growing on a slope. At temperatures of  $-15^{\circ}$  C. and lower a few plants were still uninjured and death only occurred at temperatures lower than  $-20^{\circ}$  C.

It is concluded that *A. fordii* can be grown in regions with continental climates which are unsuitable for the cultivation of citrus in exposed situations.

*Noted.*

1045.

a AGNIHOTRI, B. N.

**A brief note on grapefruit and how to prepare jelly from it.**

*Indian J. Hort.*, 1949, 6: 3/4: 8-10.

b MUNGER, F.

**Effect of temperatures on the California red scale [of citrus].**

*Calif. Citrogr.*, 1949, 34: 464, bibl. 6.

c WOGLUM, R. S.

**History of fumigation [of citrus, from 1885 onwards] in California.**

*Calif. Citrogr.*, 1949, 35: 46-7, 65-72.

## TROPICAL CROPS.

### *General.*

(See also 1166, 1185, 1190, 1200.)

1046. TERRA, G. J. A.

**The ethnological affinities of the type of horticulture in Indonesia.**

*Chron. Nat.*, 1949, 105: 323-6, bibl. 6.

In settled Indonesian communities the arable land generally consists of wet fields for rice, dry fields for manioc, and mixed gardens where fruit and vegetables are grown for home use. The wet and dry fields furnish the staple food, but the mixed gardens have to supply most of the supplementary food factors, such as vitamins, flavourings, mineral salts and additional proteins. They are therefore of considerable importance, and one would expect to find them in all settled communities where ecological conditions are suitable. These mixed gardens, however, are associated only with matriarchal and parental peoples and never with patriarchal peoples. This fact must be taken into account by the Agricultural Extension Services in their attempt to promote mixed gardening. The author briefly describes the development of these peoples and their systems of agriculture, and discusses in greater detail the distribution of mixed gardening in Indonesia.

1047. WALKER, E. H., AND RODIN, R.

**Additional phanerogams in the flora of Guam, with notes on unverified records.**

*Contr. U.S. nat. Herbarium*, 1949, 30: 449-68.

An addition to previous lists of Guam plants compiled by Bryan, Merrill and others listed here.

1048. RODRIGO, P. A.

**A general review of research work on Philippine crops with special reference to vegetables.**

*Philipp. J. Agric.*, 1949, 14: 85-94.

A popular account of progress made, since the early part of the century, with a wide range of crops including: rice, sugar-cane, fibres, fruit and plantation crops, the soya bean and many vegetables.

1049. VAN VEEN, A. G., AND LATUASAN, H. E.

**The state of djenkolic acid in the plant.**

*Chron. Nat.*, 1949, 105: 288-9, bibl. 9.

The sulphur-containing amino-acid, djenkolic acid, is known to occur only in the poisonous djenkolbean *Pithecolobium lobatum*, and in the fruit of a closely related species, *P. bubalinum*. A chemical analysis showed that this acid occurs in the fruit in a free state. It could not be found in the leaves or twigs of the djenkol tree.—Eykman Institute, Batavia, and Technical Institute, Delft.

### *Cacao.*

(See also 1192.)

1050. CHEESMAN, E. E.

**Research and cocoa production.**

*Research*, 1950, 3: 12-16, bibl. 4.

"Examination of the conditions under which cocoa is grown shows that, although the obvious threat to supplies comes from plant diseases, there are deeper underlying reasons for the precarious state of the industry." The author assesses the immediate problems of disease control, and stresses the need for fundamental investigations into the production of more efficient planting material, which will respond to intensive culture, and into the complex interaction of shade, protection, nutrition and water supply. Finally microbiology and biochemistry must evolve improved methods of preparing cocoa beans on the plantations."

1051. CIFERRI, R.

**Algunas características de los cacaos Criollos de Venezuela. (Some characters of the Criollo cacaos of Venezuela.)**

*Rev. Fac. nac. Agron. Colombia*, 1949, 9: 1-16, bibl. 6, illus.

Figures for fruit size, yield and quality of the red- and white-fruited Criollo types of cacao are compared, and their morphological characters are described. These are further compared with similar data for the



Criollo hybrids and the Forastero type of Venezuela. Finally an account is given of the distribution of the Criollo types in Venezuela.

1052. FOWLER, R. L., AND LÓPEZ, G. H.

**The cacao industry of Ecuador.**

*For. Agric. Rep.*, 34: 1949, pp. 48, bibl. 7, illus.

This paper from the Estación Experimental Agrícola del Ecuador reviews the history of the cacao industry in Ecuador and describes its present depressed condition. Suggestions for its revival are included, among which attention is paid to the question of quality, which has deteriorated from its once highly prized condition. The principal type is cacao nacional of the Amazonian Forastero group which is of high quality. Next in importance are Trinitarios representing several introductions known collectively as cacao venezuela. Hybridization between these lower-quality types and the cacao nacional is largely responsible for the general deterioration in quality. Yields have fallen to an average of about 82 lb. dry beans per acre, with the highest average yields about 250 lb. Three hundred and thirty-nine superior trees have been selected on a basis of yield and resistance to diseases, primarily witches' broom and Monilia pod rot. These have been established at the Station by means of budding and the rooting of cuttings.

1053. CIFERRI, R.

La escoba de bruja de algunos arboles de sombrío del cacao (*Erythrina* y *Tabebuia*) en Venezuela. Una enfermedad de origen no criptogámico. (Witches' broom of *Erythrina* and *Tabebuia*, shade trees of Cacao, in Venezuela. A disease of non-fungous origin.)

*Rev. Fac. nac. Agron. Colombia*, 1949, 9: 143-7, bibl. 7.

The spread of witches' broom on *Erythrina* spp. in the Paria peninsula, Venezuela, is noted. A similar disease has been observed on *Tabebuia pentaphylla*, also a shade tree for cacao, in this district. From a study of the symptoms and a brief review of the literature on the subject, the author concludes that the diseases are not of fungous origin, that they are probably caused by viruses, and possibly related to one another. The danger of witches' broom, in addition to that of bark canker, makes it advisable not to grow susceptible species of *Erythrina* in this area.

1054. STAHEL, [G.]

Gegevens over het cacaowerk in de cultuur-tuin. (Data on propagation work with cacao [in Surinam].)

Reprinted from *Cacaowerk, Suriname*, 1949, pp. 4.

An account is given of the work being done in Surinam on the propagation of cacao plants in an attempt to revive the cacao industry of that country. One hundred plants of the high-yielding, vigorous clone ICS 95 were imported from Trinidad in 1946. By using the new leaf cutting method of propagation it has been possible to produce 50,000 plants of this clone within 3 years, whereas by the usual branch cutting method it is estimated that only 250 plants could have been produced. Cuttings were found to root best in

white savannah sand; they were ready for planting out after 8-10 months in the nursery. Other clones are being tested, but will not be available for several years. In order to maintain a high standard, uniform product for export, however, the author considers it would be advisable to distribute only plants of ICS 95, while keeping a nucleus of other good clones in reserve.

1055. CIFERRI, R.

**Geographic distribution of the great epidemic cacao diseases of Venezuela.**

*Nature*, 1949, 164: 1058, bibl. 1.

Dealing with "witches' broom" and "watery pod" disease, caused by *Marasmius perniciosus* and *Monilia roreri* respectively.

**Coconut.**

1056. DAVID, P. A.

**Coconut production and its problems in the Philippines.**

*Oléagineux*, 1949, 4: 759-61, and 1950, 5: 57-60.

At present copra is the leading export product of the Philippines, and the Republic is heavily subsidizing the coconut industry to enable it to withstand world competition. Important problems of the industry include seed selection, management of young groves, the planting of companion crops in mature plantations, control of pests and diseases, the renovation of old plantations, improvement of the quality of copra, and economy of production. Detailed recommendations are made for obtaining the greatest yield of high quality coconut products at the lowest cost of production.—College of Agriculture, Laguna.

1057. CIFERRI, R., AND CICCARONE, A.

Observaciones sobre la enfermedad de la "Hoja Bronceada" del cocotero en Venezuela. (Bronze leaf wilt of the coconut palm in Venezuela.)

*Rev. Fac. nac. Agron. Colombia*, 1949, 9: 17-26, bibl. 4, illus.

Bronze leaf wilt is, at least potentially, the most serious disease of the coconut palm in Venezuela. Symptoms as they occur in Venezuela are described in detail, and are compared with those in Trinidad and Jamaica (which differ considerably from each other). In some respects the Venezuelan symptoms are similar to those seen in Trinidad, in others to those in Jamaica, while some again are of an intermediate nature. Two conclusions are possible: (1) that bronze leaf wilt comprises 2 distinct diseases, both of which occur in Venezuela, and (2) that it is a single disease, the symptoms of which vary with the environment and the variety of palm grown. The authors tend to support the latter conclusion.

1058. JOHN, C. M., AND VENKATANARAYANA, G.  
**Note on improvement of the coconut by cross-breeding.**

Reprinted from *Madras agric. J.*, 1943, in *Bull. Indian centr. Coconut Cttee*, 1949, 3: 1-5, illus.

Trials were started in Madras in 1931, crossing the ordinary tall variety commonly grown in India with a dwarf variety attaining a height of about 15 feet. The

former yields up to 100 nuts per tree per year giving about 30 lb. of copra yielding 72% oil, the latter yields about 60 nuts giving 5 to 10 lb. of copra containing about 70% oil. After 10 years it is concluded that the progeny show hybrid vigour and combine the desirable early flowering nature of the dwarf parent with the economic nut character of the tall parent.

1059. ANON.

**Possibilities of coconut cultivation in the laterite areas of north Travancore.**

*Bull. Indian centr. Coconut Cttee*, 1949, 3: 5-7.

Experience has shown that the prejudice against growing coconuts in upland laterite areas is unfounded. More care, particularly in planting, is, however, needed than in the commonly favoured habitats of sea coast, etc.

1060. ANON.

**Tend your trees with loving care.**

*Bull. Indian centr. Coconut Cttee*, 1949, 3: 17-20.

This somewhat exuberant title covers advice to coconut growers on cultivation, which should be thorough to ensure adequate aeration, on spacing, which should be 30 feet for triangular planting to provide adequate light, and on manuring. The manuring recommended per tree per annum varies with soil types as follows:—For sands, 15 lb. fish manure, 30 lb. wood ashes and 10 baskets backwater silt; for sandy loams, 10 lb. fish manure and 20 lb. wood ashes; for clays, as for sandy loams plus dressings of sand; for laterite soils, 20 lb. wood ashes plus nitrogen equivalent to 4-5 lb. sulphate of ammonia; for trees on bunds, 20 lb. ashes plus earthing up with silt removed in cleaning canals, etc. All these treatments can be supplemented with dressings of any available dung, compost or green manures, and with inorganic fertilizers, particularly nitrogen.

1061. ANON.

**Spraying of coconut trees against leaf disease.**

*Bull. Indian centr. Coconut Cttee*, 1949, 3: 39-40.

Leaf-rot disease appears as a soft rot on parts of the central opening leaf, and these parts later dry up, turn black and drop. Many trees in Travancore and Cochin are now affected and the loss of yield is estimated at about 10%. Spraying with bordeaux mixture and Perenox keeps the disease in check and a service has been organized for spraying the trees of small growers.

1062. VENKATASUBBAN, C. S.

**The palm beetle (*Oryctes rhinoceros*—Linn) in Cochin and some problems concerning its control.**

*Bull. Indian centr. Coconut Cttee*, 1949, 3: 15-17, 37-8.

Although control measures against the beetle are well known there are practical difficulties in obtaining effective destruction. There is a natural tendency to delay removal of dead coconut trees or to replace logs used as bridges that have started to rot and are harbouring grubs. Where trenches are filled with organic refuse, preparatory to growing vegetables, etc., delay in covering the refuse with earth allows the beetle time

to lay its eggs. Similarly compost heaps left uncovered for too long have acted as breeding grounds. Failure to examine the trees and extract the beetles regularly once a quarter is another cause. The remedy is to establish an efficient plant protection service, which, through constant publicity, will persuade growers to adopt control treatments as a matter of routine, combined as far as possible with other routine operations.

1063. JOHN, C. M., AND NARAYANA, G. V.

**Varieties and forms of the coconut (*Cocos nucifera* Linn).**

Reprinted from *Madras agric. J.*, in *Indian Coconut J.*, 1949, 2: 209-26, bibl. 12, illus.

The literature on coconut varieties is reviewed, and the authors conclude that if freaks are eliminated the number is likely to be below 30. In 1921 and 1924 the Department of Agriculture, Madras, formed collections of varieties at the Coconut Research Station, Pilicode, from seed obtained in all the important coconut-producing countries in the Indian archipelago and the Far East. The available material has now been subjected for the first time to a systematic classification. *Cocos nucifera* is divided into two main groups, the tall and the dwarf; the former contains three varieties and nine forms and the latter two varieties and two forms. Tall varieties include var. *typica*, the ordinary plantation variety, amongst which nine main forms are found and named as follows: *ramona*, *Kappadan*, *gigantea*, *nova-guineana*, *cochin-chinensis*, *malayensis*, *siamea*, *laccadive*, and *pusilla*. The two other tall varieties distinguished are var. *spicata* which is almost pure female, the male flowers numbering as little as 50, and var. *androgena*, a purely male variety. The true dwarf, var. *nana*, is subdivided into forma *nana* and forma *maldiviana*. The other dwarf, var. *javanica*, is intermediate in size between var. *nana* and the tall varieties and is breeding true. All these varieties and forms are described and a key for their identification is included. From the commercial standpoint the outstanding forms are the var. *typica* forms; the Laccadive, yielding regularly over 100 nuts of good quality per annum; the famous San Ramon from the Philippines, where it is said to yield up to 200 large nuts of good quality; and the semi-dwarf mutant var. *javanica*, which is considered sufficiently promising to merit extended trials. The authors emphasize, however, that much work remains to be done before the classification of coconuts can be regarded as complete.

*Coffee.*

1064. JONES, P. A.

**Field trials with coffee in the Trans Nzoia.**

*Mon. Bull. Coff. Bd Kenya*, 1949, 14: 164-5.

The results of five trials each carried out over 5 to 8 years are summarized, four being at Kitale Experimental Station and one on an estate. *Mulching*: In a 7-year period 3 mulch treatments gave more than 10% increase in crop over control, although in a wet year complete mulching was detrimental. Mulching between rows gave significantly heavier yields than either complete mulching or mulching under the trees only. *Manuring*: Compost and phosphates, alone and in combination, have shown no regular differences.



**Size of planting holes:** Yield records over 8 years show a significant difference in favour of holes 2 ft.  $\times$  2 ft. and larger compared with smaller holes. **Pruning:** Results from two trials are inconclusive, although in one case the 7-year totals showed single-stem trees yielding 20% more crop than multiple-stem, except where the number of primaries in the former was reduced to only 15.

1065. MAYNE, W. W.

The growth and bearing habit of *Coffea arabica* L. under South Indian conditions. *Indian J. Hort.*, 1943, 1: 98-106 [received 1949].

Several types of lateral branches are distinguished. Primary lateral branches arise in pairs from the main vertical axis. Topping the latter encourages the production of secondary laterals from the primary laterals. These secondaries are of two sorts: True secondaries occurring in pairs and adventitious branches arising more generally from basal nodes and not necessarily paired. The former produce flowers but rarely produce further branches, the latter give rise to further paired laterals and also to new adventitious branches. In adult coffee on the single stem system used in India the crop is borne mainly on adventitious laterals. Most of the flower buds arise from leaf axils on wood that is 12-18 months old, flowering usually occurring 9-10 days after the first substantial shower which ends the dry season. The greater part of the annual shoot growth is initiated with these first rains, and there is evidence of a marked antagonism between vegetative and reproductive phases. Conditions existing in one year have in turn a major effect in determining the size of the crop the following year. As a result, biennial bearing or irregular modifications of it are commonplace, the wide fluctuations being determined both by the amount of bearing wood and the number of flower buds differentiated during the dry season preceding blossoming. There is evidence that under S. Indian conditions the carbohydrate economy of the trees is the main limiting factor in crop production.

1066. BOREL, E.

La fumure des caféiers au Tonkin. (The manuring of coffee in Tonkin.) *Rev. int. Bot. appl.*, 1949, 29: 445-72, bibl. in text.

The manuring of coffee is discussed from various aspects, organic v. inorganic, methods of supplying organic matter, costs, etc., and the results of various simple trials in Tonkin as well as in other parts of the world are quoted together with analyses of soils and plants to support the general conclusions drawn. Both organic manure and inorganic NPK fertilizers and in some cases lime are needed to obtain optimum economic yields. An annual allowance of 10 kg. organic manure is suggested, but as good, and perhaps better, results are obtained if double applications are made in alternate years, the manure being placed in small circular trenches round each bush as compared with semi-circular trenches used for annual dressings. It is suggested that the chemical composition of coffee bushes and crops should form a guide for applying artificial fertilizers, the quantities and proportions being altered as the bushes grow larger and come into bearing. In general the proportions will approximate to a 2-1-2

mixture of sulphate of ammonia, bicalcium phosphate and sulphate of potash with lime added as required. The problem of supplying organic manure in sufficient quantity is difficult. To provide 1 hectare of coffee carrying 1,142 bushes with an annual dressing of 10 kg. F.Y.M. per bush would require some 10 ha. of pasture carrying 5 head of cattle, grazing by day and penned by night. The area needed for stock could be much reduced if they were permanently penned and fed on cultivated fodder crops, but this would increase labour costs considerably. Other alternatives are green manure crops such as *Tephrosia candida* (which in one case cited provided sufficient material in the ratio 1 ha. *Tephrosia* to 4 ha. coffee), composts and mulching. Mulching has the effects in dry seasons of conserving moisture, reducing surface soil temperatures, increasing nitrogen fixation, as well as of reducing erosion and suppressing weeds. Amongst crops that might well be cultivated to provide mulching material is *Paspalum virgatum* and it is suggested that trials should be carried out on the basis of 1½ ha. grass for cutting to 1 ha. of coffee.

1067. MALLAMAIRE, A.

Les pourridies du caféier en Afrique occidentale. (Root diseases of coffee in West Africa.)

*Agron. trop.*, 1949, 4: 508-12, bibl. 8, illus.

Several species of fungi, *Fomes*, *Armillaria*, etc., attack and kill coffee and other trees. Control is limited to preventive measures including: choice of areas free of woody debris; where trees have first to be cleared the ringing of such trees 4-6 months before felling and the poisoning of the stumps thereafter with arsenicals, this procedure being designed to reduce the carbohydrate content of the roots left in the ground; the use of non-susceptible shade trees; the avoidance of injuries in cultivation; and the destruction of diseased trees by fire. The method used in the Congo of removing the earth from round the main roots of rubber trees is suggested for trial with both coffee and cacao. The use of resistant strains of coffee or of grafting on to resistant rootstocks should also be considered. The article is followed by comments both by R. Portères and the author on varietal susceptibility, modes of infection and control measures [pp. 512-14, additional bibl. 2].

1068. USMAN, S.

The coffee berry borer (*Araecerus fasciculatus*, DeG.).

*Mon. Bull. Indian Coffee Bd*, 1949, 13: 142-9, bibl. 8.

A list of distribution and hosts indicates the catholicity of this insect's tastes. The damage done by it in India is not so serious as that caused by *Stephanoderes hampei* in other lands. Control measures, which are indicated, should keep it in check.

1069. DUVAL, G.

Progressos no combate à broca do café com hexacloreto de benzeno. (Progress in the control of coffee berry borer with benzene hexachloride.)

*Biológico*, 1949, 15: 85-102, bibl. 7.

Experiments made in 1948/49 at the Instituto Biológico, São Paulo, on methods and strengths of application of

benzene hexachloride are reported. It was found that 4 applications of a dust containing 2% gamma isomer were more effective than the same number of applications of a 1% dust. Four applications of a 2% dust, however, at 20-day intervals were just as successful as 2 applications of 4% dust at 40-day intervals. The most important finding of these experiments, however, was the fact that the most effective and economic control of coffee berry borer can be obtained by applications of benzene hexachloride dust to the soil under the trees. This prevents reinfestation of the trees by insects emerging from the fallen fruit. Soil applications beginning in October were more effective than applications to trees beginning in November. A combination of the 2 methods did not give the improved control expected of it. The method of soil applications has many economic advantages.

1070. PINTO DA FONSECA, J.

O "bicho mineiro" das folhas do café e seu combate. (Coffee leaf miner and its control.)

*Biológico*, 1949, 15: 167-72.

Coffee leaf miner (*Perileucoptera coffeella*) periodically becomes a serious pest in Brazil, especially in times of prolonged drought or in poorly nourished plantations. Recent trials indicate that it may be controlled by benzene hexachloride or 5% Rhodiatox emulsions (200 c.c. in 100 litres water) applied at fortnightly intervals from May to July. In severely infested areas the soil under the trees should also be sprayed. Chemical control should be supplemented by soil improvement.

1071. WRIGHT, N.

Copper sprays for coffee in East Africa.

*Pl. Prot. Overs. Rev.*, 1949, 1: 3: 38-41.

The treatments mentioned are of two kinds, A. Toxic to prevent leaf-fall in dry months following long rains, and B. Fungicidal spraying to control rust (*Hemileia vastatrix*). The choice of materials, amount and concentration of sprays, and cost of spraying are discussed. In the Kenya experiments the cuprous oxide preparation Perenox was used.

### Fibres.

1072. REINKING, O. A.

Abacá disease studies: Davao, Philippine Islands.

*Plant Dis. Repr.*, 1949, 33: 456-62, bibl. 16.

A report on the diseases of abacá (*Musa textilis*) in the Philippine Islands, based on observations made in September 1949. It consists of a note on the eradication of bunchy top, a description of mosaic (symptoms, transmission, hosts, control) and brief accounts of *Marasmius* sheath rot and of stem-rot (*Helminthosporium torulosum*).

1073. NAIK, K. C.

Banana fibre investigations.

*Indian J. Hort.*, 1944, 3: 14-28, bibl. 16 [received 1949].

Studies were made at Coimbatore on 1,216 pseudostems from 72 cultivated varieties of banana, 2 wild bananas and the abaca-yielding *Musa textilis*. Yields of fibre calculated on an acreage basis varied greatly,

but *M. textilis* was well ahead of all other varieties. Laboratory tests, however, showed several cultivated bananas producing fibre superior to *M. textilis* both in tensile strength and quality, although this may be due either to inferior abaca varieties or to environmental influence. At the present stage it would appear to be most economical to extract banana fibre after harvesting the bunch. This fibre, immersed in water and saline solutions for six months, showed little deterioration, and thus appears to be suitable for marine cordage as well as for rope, gunny making and for use as grafting bandages in nurseries. Hand extraction, by drawing strips of leaf stems under a blunt knife, proved more economical than using a hand-operated machine, but a cheap and effective extractor will be needed if the industry is to expand.

### Fruit crops.

1074. ANON.

The fruits of Spain. The Canary-Island banana.

[Publ.] Sindicato Vertical de Frutos y Productos Hortícolas [Spain], [no date, received 1950], pp. 32, illus.

A popular pamphlet in English dealing with the banana industry in the Canary Islands, its history, special cultural practices and trade. Tables of production and export figures for 1938-47 are given. For the last half-century the banana industry has been the basis of the islands' economy. Although the climatic conditions are so favourable that fruit can be produced all the year round, great care is needed in the preparation of the land. The underlying rock has to be broken to a considerable depth, the surface levelled, and terrace walls, windbreaks and irrigation channels constructed. The system of planting on multiple terraces prevents the use of machinery or even animals for cultivation, so all the work has to be done by hand. For this reason the estates are very small, 87% of them covering less than 1 hectare.

1075. BAGLEY, F. D.

Carnarvon bananas.

*Res. Rep. Univ. W. Aust. geog. Lab.* 9, 1949, pp. 5, bibl. 3.

A brief account, with tabulated data on climate and acreages, is given on the growing of bananas at Carnarvon, Western Australia. With a rainfall of about 9 inches a year, low atmospheric humidity and a relatively light soil, irrigation is essential. Varieties grown are Golden Gros, Gros Michel, Cavendish and Copperleaf Cavendish, with a few Lady Finger and Sugar. In 1948/49 the total acreage had risen to over 500, and production, still absorbed locally, reached 76,206 bushels. It is believed that the average yield, reaching about 300 1½-bushel cases per acre in good seasons, is one of the highest in the world, despite the unique climatic conditions.

1076. MALAN, E. F.

Banana production [in S. Africa].

*Fmg S. Afr.*, 1949, 24: 465-8, bibl. 5, illus.

This is a slightly expanded version of the article on Cavendish bananas abstracted in *H.A.*, 19: 3439. Information is added on artificial ripening.



1077. HILL, A. G. G., AND CAMPBELL, G. K. G.  
**Prolonged dormancy of deciduous fruit-trees in warm climates.**  
*Emp. J. exp. Agric.*, 1949, 17: 259-64, bibl. 32.

A well documented review of the problem and its remedies. It is concluded that, while control of water supply, shading, pruning or spray treatments are palliatives, the real solution of the problem can best be found through breeding and selection of "resistant" varieties, i.e. varieties that will emerge from dormancy without delay despite lack of chilling. Useful lists of relatively "resistant" varieties, suitable for growing in the Western Cape Province of South Africa, California, and the Kenya highlands, are quoted.

1078. SEN, P. K., MALLIK, P. C., AND GANGULY, B. D.  
**Hybridization of the mango.**  
*Indian J. Hort.*, 1946, 4: 4-15, bibl. 8, illus.  
 [received 1949].

Six mango varieties were used in inter-varietal crosses at Sabour in 1942, an additional 4 varieties in 1943, while in 1944 crosses were repeated with 4 varieties. Numbers of flowers pollinated ranged from over 2,000 to nearly 4,400, but the hybrid plants resulting in the three years were only 14, 29 and 19. Nevertheless, this compares well with results obtained in nature. The difficulties encountered in hybridization are discussed and the technique adopted is described in detail. It is suggested that much better results might be obtained with trees grown under glass.

1079. SEN, P. K.  
**On the flowering on stock stem of mango grafts at nursery stage.**  
*Indian J. Hort.*, 1945, 3: 92-5, bibl. 1  
 [received 1949].

In mangoes propagated by approach-grafting, flowering on the scion shoots during the season following grafting is not uncommon, but occasionally, coincidentally with flowers on the scion, flowers have also been seen on the young seedling stocks. Various treatments applied to determine the cause of this unexpected phenomenon gave the following results from 50 replicates: Ringing the seedlings 3 inches above the base and approach-grafting one seedling with another seedling had no effect. By contrast, grafting scion shoots from mature trees of the varieties Fazli and Langra, the branches of which had been ringed, had a conspicuous effect; out of 50 grafts in each case 32 stocks grafted with Fazli and 10 with Langra produced flowers, whereas with similar grafts from unringed branches the figures were 4 and nil. The physiological factors responsible remain to be determined.

1080. NAIK, K. C., AND RAO, M. M.  
**Studies on blossom biology and pollination in mangoes (*Mangifera indica* L.).**  
*Indian J. Hort.*, 1943, 1: 107-19, bibl. 9  
 [received 1949].

A 20-year-old grafted mango orchard containing 5 varieties and a 3-year-old variety collection at Kodur formed the material for studies carried out from 1939 to 1942. The authors summarize their results as follows: "1. Certain varieties have been shown to

produce more than one crop of blossoms in a year. These double, triple or off-season cropping varieties are of considerable economic importance. 2. Parthenocarpic fruits do not seem to form a common feature in mango production. The necessity for pollination in mangoes has been brought out. 3. Certain combinations of varieties as female or male parents or vice versa have been indicated to be more appropriate than others for optimum fruit set. 4. A high positive relationship is observed between the percentage of perfect flowers and the number of fruits carried to maturity per panicle. 5. Mixed panicles have been found to occur largely in younger stages of the plantations except in one of the varieties under study. 6. Shorter style length and lower ratios of style length to stamen length may be conducive to a better set of fruits by open pollination at least in certain varieties. 7. The first two weeks have been shown to be the most important from the point of view of fruit-shedding in mangoes."

1081. RANDHAWA, M. S.  
**A giant mango tree.**  
*Indian Fmg.*, 1949, 10: 257-8, illus.

The tree referred to is in East Punjab; its crown covers 2,700 square yards with individual branches 70-80 feet long and the trunk 32 feet in circumference.

1082. SETHI, W. R.  
**Mangoes on the East African coast.**  
*E. Afr. agric. J.*, 1949, 15: 98-9.

Brief descriptions are given of 7 mango varieties commonly found growing on the E. African coast: superior types: Ngowe, Boribo, Batawi, and inferior: Dodo, Zahfrani, Kitovu, Punda. There is a note on propagation by seed and by inarching and budding as these are practised in India.

1083. VENKATARATNAM, L.  
**Hormone induced set and parthenocarp in mango (*Mangifera indica* L.).**  
*Curr. Sci.*, 1949, 18: 409, bibl. 3, illus.

After removing staminate flowers and leaving only 20-30 bisexual flowers with their stamens emasculated, spraying with water containing 10 p.p.m.  $\beta$ -naphthoxy-acetic acid produced some improvement in fruit set in three mango varieties. Development was, however, parthenocarpic, the embryo being found completely inhibited in growth.

1084. SAMBAMURTY, K.  
**A note on new method of grafting in mangoes.**  
*Indian J. Hort.*, 1949, 6: 3/4: 6-7, illus.

The method, so far tried only on a small scale, involves cutting off the scions in lengths of 2½ to 3 ft., removing all but the tip leaves, approach-grafting on to root-stocks standing in pots plunged in soil and burying 12-18 inches of the basal portion of the scion shoot in the soil adjoining the pots. The grafts were wrapped with cloth strips dipped in paraffin wax and tied with twine, and the bandage was covered with clay and cow-dung paste. The first union was complete 6-7 weeks from grafting.

1085. SEN, P. K., ROY, P. K., AND DE, B. N.  
**Hunger signs on mango.**  
*Indian J. Hort.*, 1947, 5: 35-44, bibl. 4, illus.  
 with coloured plates [received 1949].

A sand culture experiment is described in which Langra mangoes were grown in pots at Sabour for 6 years and subjected to the following treatments: Full nutrient solution (NPK), 3 levels of N+PK, 3 levels of P+NK, 3 levels of K+NP, and water only as control. Effects started to appear in 3 months and became yearly more pronounced. Chemical analyses of the leaves are tabulated and deficiency symptoms are described in detail with the aid of coloured plates. The results indicate that the supply of N controls the uptake of other elements and determines growth. There is an optimum level of N, above which the plants develop K, but not P, deficiency symptoms. The balance between K and N appears to be of major importance. K deficiency causes die-back which proves fatal to the plants.

1086. SEN, P. K., AND MALLIK, P. C.

Effect of smudging on mango.

*Indian J. Hort.*, 1947, 5: 29-34, bibl. 3 [received 1949].

The Philippine method of inducing flowering in mangoes by smudging with smoke from small heaps of burning green grass was tried at Sabour on Langra mango trees expected to be in their off season. Smudging maintained on two trees for 4 weeks produced leaf fall and stimulated vegetative growth not only from terminal buds but from axillary buds as well. It did not induce flowering. As the difference in temperature between treated and control trees was only 2° C, the authors conclude that the effect was not due to heat, but to the smoke itself, and perhaps to ethylene gas which is one of the chief constituents of the smoke.

1087. KHAN, K. F.

Crop yields in mangosteen (*Garcinia mangostana*) as influenced by seasonal conditions.

*Indian J. Hort.*, 1946, 4: 39-42 [received 1949].

Crop records over 3 years at Kallar and Burliar stations in S. India indicate that the mangosteen regularly produces two crops a year, the monsoon crop generally, but not invariably, being the bigger. Yields vary greatly from year to year, and there is some evidence to suggest that cropping is adversely affected by relatively large amounts of rainfall and an increased number of rainy days during the pre-blossom period.

1088. WILLIAMS, C. G.

Harvesting, handling and packing pineapples.

*Qd agric. J.*, 1949, 69: 324-39, illus.

Recommendations given *Ibid.*, 65: 380-8 and noted in *H.A.*, 18: 1443 are expanded and brought up to date.

1089. MERNY, G.

Les maladies de l'ananas. (Pineapple diseases.)

*Fruits d'outre-mer*, 1949, 4: 327-31, bibl. 13, illus.

The author summarizes work done in several countries on diseases of the pineapple, notably wilt and green spotting, associated with attacks by the mealybug, *Pseudococcus brevipes*. Control measures tried include spraying with oil emulsion, destruction of ants which nurse the mealybugs, biological control and the use of resistant varieties. Among physiological disorders mentioned briefly are those associated with deficiencies of, or lack of balance between, Cu, Zn, B and Fe, and

also the diseases known as black heart, deep eye, sunscald, spike, sanding and tangle root.

1090. OSBURN, M. R.

Parathion dust for control of the pineapple mealybug.

*J. econ. Ent.*, 1949, 42: 557.

In 1948 preliminary tests were conducted in Florida to determine the effectiveness of parathion dust for control of the pineapple mealybug (*Pseudococcus brevipes*). This pest feeds on the base of the pineapple leaves and on the roots below the soil surface, and is responsible for the disease known as pineapple wilt. One application of the 1% dust at the rate of 0.35 oz. per plant was completely effective for at least 4 weeks. One application at the rate of 0.16 oz. per plant reduced the infestation but did not appear to affect the mealybugs below the surface of the soil. Two applications at the lower rate were no better than one. The treatments did not injure the pineapple plants.—Bur. Ent. Pl. Quar. U.S.D.A.

### Oil plants.

1091. HENRY, P., AND GASCON, J.-P.

Les palmiers à huile du type pisifera et la stérilité. (Pisifera oil palms and sterility.)

*Oléagineux*, 1950, 5: 29-34, bibl. 7, illus.

A high percentage of the pisifera type of oil palm (*Elaeis guineensis* var. *pisifera*) are more or less sterile. However, a few perfectly fertile trees are known, and a small proportion of the others are sufficiently fertile to be grown economically. The type is characterized by shell-less fruit and large vegetative organs. As the result of a careful study of sterility in pisifera and other varieties, the authors offer a genetical interpretation of the problem. They conclude that, in general, the factors for shell-lessness and sterility are linked. They can, however, be dissociated if "crossing over" occurs. This is shown by the existence of fertile pisifera and sterile trees of other varieties. The vigorous vegetative development of pisifera is associated with the factor for sterility and not with that for shell-lessness. Abortion and fertility are both hereditary characters. These findings are of great importance in selection work, for they imply that highly fertile specimens of pisifera may be crossed with trees of the dura variety without fear of introducing the sterility factor.

1092. WIERSUM, L. K.

Enige gegevens voor een mogelijke cultuur van Clausena. (Clausena as a possible plant crop.)

*Landbouw*, 1949, 21: 445-55, bibl. 1, illus.

The author gives the results of investigations, his own and those of other workers, on the cultivation of *Clausena anisata* in Java and its possible value as an essential oil-producing crop. The species is a shrub or small tree, the leaves of which contain a high percentage of aniseed oil. The only other plant of importance producing this oil is *Illicium verum*, cultivated in S.E. China. As this tree takes 16-17 years to come into production, compared with 2½ years for *C. anisata*, there is reason to believe that the culture of *Clausena* may be a good commercial proposition. The tree can only be grown satisfactorily below 500 m.



It requires a plentiful supply of soil moisture. As few seeds are produced, vegetative propagation is advisable, and the best results are obtained by budding on the indigenous stock, *C. excavata*. Budded trees, moreover, are more vigorous, come into production earlier, and regenerate more quickly after harvest than seedlings. Trees should be planted out at 1.5-2.5 m. apart. Observations made at Buitenzorg indicate that shading is not necessary. Cover cropping is advisable both to maintain the fertility of the soil and to prevent erosion. The most satisfactory method of harvesting appears to be a bi-annual pluck of the old leaves. Alternatively, the trees may be pruned back to 1-1.5 m., or cut down to a height of 0.5 m., once a year. These treatments have the advantage of keeping the trees dwarf, but they retard regeneration. Figures are given to illustrate the effect of these three methods. Harvested leaves should not be kept for more than two or three days before extraction, as the oil content decreases rapidly on drying. At the first pluck budded trees may be expected to yield 25 kg. of oil per ha. Although no long-term production figures are available, observations made at Buitenzorg indicate that a yield of 100 kg. per ha. per year can be expected.—Botanical Institute of the General Agricultural Research Station, Buitenzorg.

### Rubber.

(See also 1173.)

#### 1093. VOLLEMA, J. S.

Resultaten van een proef met toppen van jonge hevezaailingen. (Results of an experiment in topping young hevea seedlings.)

*Bergcultures*, 1949, 18: 449-51, bibl. 11.

In 1935 a replicated experiment was laid out on the Soebang-Tjipeo estate in Java to determine the effect of topping on hevea seedlings. Tjikadoe seedlings, 15 months old, were cut back to a height of about 2½ m. The following year the number of young shoots was reduced to 3 or 4 per tree. After 4 years the increase in girth of topped trees was about 5% greater than that of the controls. There was no difference in the number of replacements needed, in wind damage, or in latex production. This treatment is therefore recommended as a simple and safe method of inducing satisfactory growth in excessively tall, unbranched seedlings.—C. P. V. Research Station, Java.

#### 1094. VAN SCHOONNEVELDT, J. C.

Spiraaltap. (Spiral tapping.)

*Bergcultures*, 1949, 18: 519-23.

In 1948 the author tentatively suggested the use of a modified spiral tapping system for hevea trees in Java [see *H.A.*, 19: 1577]. The effect of such a system over a number of years had not been determined. The following year the results of a trial of spiral tapping, carried out in Liberia from 1941 to 1947, were recorded in an article by Spangler and McIndoe.\* This article is here fully abstracted and the results of the trial discussed. The fact that hevea clones recommended for large-scale planting in Java were used makes the results of special interest to planters there. With all clones except AV152, the yield obtained by spiral

tapping (S, d/4, 100%) was greater in the first year than that obtained by a standard tapping system (S/2, d/2, 100%). During the following 5 years, however, the yield was considerably less, except with the normally low-yielding clone AV256 and with old seedlings. In general, too, the dry rubber content was lower. In all cases spiral tapping retarded the increase in girth of stem, and resulted in an earlier and longer rest period. Only in the clones AV49 and Tjir 16 was incidence of brown bast disease higher, and the cuts healed equally well in both systems. The author concludes, from these results, that spiral tapping cannot be recommended, except possibly for old seedlings and for the low-yielding clone AV256.

#### 1095. CARPENTER, J. B.

Production and discharge of basidiospores by *Pellicularia filamentosa* (Pat.) Rogers on Hevea rubber.

*Phytopathology*, 1949, 39: 980-5, bibl. 4.

A study of the fungus causing a leaf spot of *Hevea brasiliensis*. It appears to be well adapted for persistence and for parasitizing the host within its environment.—Estación Cent. de Colon. Tingo Maria, Peru.

### Sugar cane.

(See also 793-795, 1169-1171, 1175, 1187, 1192.)

#### 1096. KHANNA, K. L., AND SHARMA, S. L.

Studies in the anatomy of sugarcane stalk.

Part II. Milling characteristics of varieties.

*Proc. Indian Acad. Sci., Sect. B*, 1949, 29: 23-34, bibl. 10, illus.

The anatomical structure of the stalks of 6 varieties of sugar cane was studied in an attempt to determine how far the quantity of fibre could be used as an index to the milling character of the cane. Fibre content, estimated by the amount of lignification of the cell walls of parenchymatous and sclerenchymatous tissue, not by the number or size of vascular bundles per unit area, was found to be a satisfactory basis on which to judge the milling character of the canes.—Central Sugarcane Research Station, Bihar.

#### 1097. SHARMA, S. L., AND KHANNA, K. L.

Studies in the anatomy of sugarcane stalk.

III. Fission and pseudo-fission.

*Proc. Indian Acad. Sci., Sect. B*, 1949, 29: 35-47, bibl. 2, illus.

An abnormal case of bifurcation of the stalk of the cane variety BO17 was noticed, in which the 2 forks appeared to unite again above the fission to form a single stalk. The morphology and anatomy of this stalk, together with that of normally bifurcated stalks, are described in detail, and an attempt is made to explain the phenomenon.—Central Sugarcane Research Station, Bihar.

#### 1098. LAL, K. N., AND SHRIVASTAVA, S.

Studies in crop physiology. Nutrient effects upon development and vegetative vigour of sugarcane.

*Proc. Indian Acad. Sci., Sect. B*, 1949, 29: 109-28, bibl. 5.

Sugar cane nutrition, with particular reference to the part played by boron, was studied at the College of Agriculture, Benares Hindu University, in a series of 3 experiments. These were designed to determine:

\* G. P. Spangler and K. G. McIndoe. Full-spiral tapping of *Hevea brasiliensis*. *India Rubber World*, Feb.-March, 1949.

(1) the response to boron of cane grown in sand culture with complete nutrient solutions, (2) the response to boron of cane grown in solutions deficient in N, P or K, and (3) the effects of nitrogen, phosphoric acid and boron on the vegetative vigour and juice quality of cane grown in the field. The results are analysed in detail. They indicate, among other things, that the addition of 10 p.p.m. of boron to an otherwise complete nutrient solution will increase height, tillering and yield of stripped cane. In the field boron partially overcame the effects of P and K deficiencies in respect of yield, sucrose content and purity of juice. The optimum concentration of boron depends on the general nutrient status of the soil. It was found that the factor of age had a more important effect on the vegetative development of the plant than that of nutrition. Three critical stages during the life cycle of the plant were noticed, and the contribution of each of them to the development of the plant is examined.

1099. LAURITZEN, J. I., AND OTHERS.

**Effect of freezing temperatures on different varieties of sugarcane and the millability of damaged sugarcane in Louisiana.**

*Tech. Bull. U.S. Dep. Agric.* **991**, 1949, pp. 35, bibl. 11.

Extensive observations were made of freezing injury of sugar cane in commercial fields and experimental plots at the United States Sugar Plant Field Station, Houma, La, and a comparative study was made of symptoms of freezing injury in many varieties under similar conditions. The chemical and physiological changes that occurred as a result of different levels of freezing conditions in standing and windrowed cane and in cane stored at different temperatures were also compared. Only minor varietal differences in susceptibility to injury were observed, and these were not consistent at different levels of freezing conditions. Badly frozen cane kept better in the windrow than when standing, and at low than at high temperatures. The results of analyses indicate that cane in which a high percentage of leaves and terminal buds, and some eyes, are injured or killed by freezing temperatures may, under favourable conditions, synthesize sucrose.

1100. SANKARAM, A.

**The sugarcane crop in the Vizagapatam district and its weather requirements.**

*Indian Fmg.*, 1948, 9: 4-12 [received 1949].

A study of the weather requirements of the sugar cane crop in the Vizagapatam District of Madras was made from data of climatic factors and crop growth recorded over a 10-year period at the Agricultural Research Station, Anapakalli. These data show that cane passes through 3 well-defined phases, each of which requires specific climatic conditions. Even distribution of rainfall and bright days with low humidity favour germination. Lack of moisture and cyclonic winds may have a serious effect during the stage of greatest vegetative growth. Bright, clear weather during a continued period of fairly low temperatures is conducive to crop ripening. The integrated effect of climatic factors on the different growth phases of the crop is graphically illustrated. To assist co-operation between the Weather Warnings Service and the grower, a weather calendar for the cane crop in the Vizagapatam District is presented.

1101. CHOPRA, J.

**How to store sugarcane after harvest.**

*Indian Fmg.*, 1947, 8: 460-1.

Various treatments were compared in the Punjab to reduce losses in weight and sugar recovery of cane that for one reason or another cannot be crushed immediately after cutting. Good results were obtained in cane kept up to 16 days when soaked in water, soaked in alkali water (0.1% sodium carbonate), soaked in water containing hormone 2,4-D, or kept covered with earth. Storage in a room or covering with trash showed negligible improvement over piling the cane in heaps in the sun.

1102. VARAS, D.

**Deterioro por estacionamiento de algunas variedades de cañas Tucumanas. (Deterioration due to a delay in milling of some varieties of Tucuman sugar cane.)**

*Bol. Estac. exp. agric. Tucuman* **64**, 1949, pp. 26.

The relative susceptibility of 11 varieties of sugar cane to deterioration in the period between cutting and milling was determined. The results of 2 experiments indicate that Tuc. 2705 and Tuc. 2645 are the least susceptible, and Tuc. 1406, Tuc. 2680, and Tuc. 2634 the most susceptible to deterioration. This knowledge will enable growers who know that there must be a delay in milling to plant the varieties that deteriorate least, and growers with established plantations to deliver their susceptible varieties as quickly as possible. It was also found that when the canes were covered with leaves after cutting, the loss of weight and loss of sugar was less in almost all cases than when they were left exposed in the field.

1103. DAULATRAM, S. J.

**Sugar industry in India.**

*Indian Fmg.*, 1949, 10: 68-72.

An address given by the Minister for Food and Agriculture at a meeting of the Indian Central Sugarcane Committee in October 1948. Among the points made are the following: Sugar prices, 60% to 70% of which is accounted for in the price of sugarcane, must be reduced if consumption in India is to be increased to a satisfactory dietary level. Some progress has been made, but it is in yields of cane that the greatest increases could be made; the average yield in India is only 15 tons per acre compared with a range of 20 to 62 tons in other major sugar-producing countries. Lower prices, resulting in higher consumption, should come from improved yields rather than from an increase in acreage, which could only be made at the expense of other crops. Suggestions are made for re-organizing the work of the Central Committee, for the establishment of a Development Committee, and for studying the problems of the *gur* and *khandsari* industries.

1104. SINGH, S. D.

**Indian sugar industry.**

*Indian Fmg.*, 1949, 10: 262-4.

This address by the President of the Indian Central Sugarcane Committee given in February 1949 repeats many of the points summarized in abstract 1103 above. In addition there is a table of statistics for the industry comparing 1945-46 with 1931-32. There have been notable increases in total acreage under cane and in



particular in the area under improved varieties. The recovery of sugar has improved and the number of factories increased fourfold, with an attendant increase in the production of manufactured sugar, and the cessation of imports. The only really unsatisfactory feature is that the yield of cane per acre has shown no real improvement, the figure for both years being approximately 14 tons, although in intervening years the range was 15 to 15.6 tons.

1105. M.-L., H. [MARTIN-LEAKE, H.].

**The sugar cane in India.**

*Int. Sugar J.*, 1949, **51**: 16-17.

The bulk of the cane crop in India is grown on peasant holdings, yields being low owing to the economic circumstances under which the crop is grown. The future of this peasant industry is discussed in a series of articles published in the *India Sugar Supplement* and reviewed here. Reasons for the "breakdown" of new, high-yielding varieties after a short period of cultivation are discussed, and the suggestion is made that these new varieties disturb the delicate balance of fertility preserved by the traditional peasant system of cultivation, by taking more from the soil than the old varieties. Other subjects considered are methods of closing the gap between peasant and factory, and methods of increasing yields by improving facilities for irrigation, distributing seed cane, organizing manuring and control of pests and diseases.

1106. MINISTERIO DE AGRICULTURA E INDUSTRIAS.

**Censo de la caña. (Census of sugar cane [in Costa Rica].)**

*Bol. téc. Sec. Publ. y Bibl. Costa Rica* **1**, 1949, pp. 131.

The number, size, production and age of the sugar cane plantations in the Republic of Costa Rica and its various cantons, the number of irrigated estates, the varieties of cane grown, the type of communications and transport used, the number, capacity and type of mills, and other aspects of the industry are analysed in graphs and tables.

1107. FERGUSON, H.

**The Zande scheme.**

*Mem. Res. Div. Minist. Agric. Sudan* **4**, 1949, being reprinted from *Emp. Cott. Gr. Rev.*, 1949, **26**: 109-22.

In this scheme for the southwest corner of the Anglo-Egyptian Sudan the growth of sugar cane and of oil palms is envisaged. Some progress has been made with sugar cane, but only the preliminary stage has been reached with oil palms and the first Board plantations of selected seed are yet to be made.

1108. TROMP, L. A.

**Production of sugar in Peru. Cane cultivation and harvesting in the land of the Incas.**

*Int. Sugar J.*, 1949, **51**: 18-21, illus.

The extent of the sugar cane industry in Peru, and the methods of irrigation, harvesting and transport practised are described. The industry, which normally produces from 400,000 to 450,000 long tons of sugar annually, has been established in the narrow coastal district bordering the Pacific, an almost rainless area owing its fertility to an elaborate system of irrigation canals supplied by a few rivers rising in the Andes. The supply of water is not always sufficient during the

dry months from May to December, and the deficit has to be made up from deep wells, the construction of which is described. Harvesting extends over a period of at least 10 months, as field work is not interfered with by rain. Cutting and loading is generally done by hand, but shortage of labour has recently led to the use of machinery for this purpose. A bulldozer designed for carting the cane from the field to the railhead is illustrated by diagrams.

1109. HES, J. W.

**Riëtaxaties. (Sugar cane crop estimations.)**

[English summary 12 lines.]

*Landbouw*, 1949, **21**: 549-57.

For the benefit of the sugar-cane mills, crop estimates have to be made several months before harvest, and these estimates often differ considerably from the crop actually obtained. Information on the reason for these errors in estimation might help to eliminate them. The author shows how a study of the ratio of the weights of the top, middle and lower parts of the sample canes used in the final maturity tests can be used to show whether these errors are due to an unexpected rate of development of the canes between the time of estimation and harvest.—Research Station for the Java Sugar Industry, Pasoeroean.

1110. FOSTER, C. B.

**The yield of sugarcane in Barbados in 1949.**

*Bull. Jamaica Dep. Sci. Agric.* **13** (n.s.), 1949, pp. 12.

B.37161 occupied 92.76% of the total acreage harvested by plantations. The yield of variety B.41211 in all rainfall categories was highly satisfactory, exceeding that of B.37161. Its distribution seems likely to increase.

1111. KHANNA, K. L., SEHGAL, B. R., AND BANDYOPADHYAY, K. S.

**Crop surveys in Bihar. I. Studies in the estimation of acre-yield of sugarcane.**

*Proc. Indian Acad. Sci., Sect. B*, 1949, **29**: 169-89, bibl. 11.

Following a serious "red rot" epidemic suffered by Co 210 and Co 213 these varieties were largely replaced by Co 313 in north Bihar and Co 331 in south Bihar. A sample survey was carried out over 3 seasons starting in 1942-43 to determine yield potentials of these new varieties under different environmental conditions. This paper gives data obtained on acreage yields as between seasons, on holdings of different sizes and as between plant and ratoon crops. Effects of soil and water-logging are also noted, as are the manurial practices used. The method of sampling employed is discussed with reference to the standard errors encountered.

1112. M.-L., H. [MARTIN-LEAKE, H.].

**Mechanization in sugar cane fields.**

*Int. Sugar J.*, 1949, **51**: 12-14, illus.

Some of the machinery now used for cultivation, planting, distribution of fertilizers and transport in sugar cane fields, that was demonstrated at Empangeni, Natal, in May 1948, is described. This demonstration is more fully reported in the First Report of the Mechanization Sub-committee of the South African Sugar Association, which appeared as a supplement to

the *South African Sugar Journal*. Some problems of mechanical cane planting are briefly discussed.

1113. MAYNE, J. E.

**A crop that defies complete mechanization.**  
*Farm Mechanization*, 1948, 2: 13: 136-8, illus.

The problems of mechanization on the sugar cane estates of the British West Indies are discussed. Mechanical cultivation must be concentrated into the short dry season from January to early April, and machinery must be exceptionally strong to stand up to the intensive work on heavy soils. American cutting machines have been tried without much success, for they are faced with the task of selective topping, cutting, cleaning and delivery. Transport is considerably hampered by the rig and furrow system of planting and the presence of deep surface drains. Modified ex-service gun carriers have been used to take the cane from field to railroad, and grab-type cane loaders are being tried out, but in normal practice the cane is still hand-cut, hand-piled, hand-loaded and ox-carted.

1114. STORY, C. G.

**Land drainage in Mackay canefields.**  
*Cane Gr. quart. Bull.*, 1949, 13: 60-3, bibl. 2, illus.

The soils in this flat country are alluvial and sandy loams, 4-10 inches deep, overlying impermeable clays or sandy clays. The average rainfall is 65 inches, most of which falls during the summer. The method of drainage generally used is surface drainage, in which combinations of implements are employed to produce a series of gently rounded ridges or beds, 8 to 24 rows of cane wide, with shallow depressions 7-15 feet wide acting as water furrows. These lead to shallow, headland drains which may be 25 feet wide and from which surface soil has been removed and spread on low spots in the field. During crop growth both furrows and main drains are kept clean of weeds by discing and grading back any accumulated silt.

1115. McCLEAN, A. P. D.

**Some forms of streak virus occurring in maize, sugar-cane and wild grass.**  
*Sci. Bull. Dep. Agric. S.Afr.* 265, 1947, pp. 39, bibl. 10, illus.

This bulletin contains sections on "Streak virus of sugar cane or uba-virus" and "Uba-cane naturally infected with both uba streak and A-streak".

1116. HUGHES, C. G., AND CHRISTIE, G. A.

**The treatment of cane setts with mercurial solutions.**  
*Cane Gr. quart. Bull.*, 1949, 13: 43-52, illus.

In parts of Queensland, particularly the Burdekin district, the rotting of cane setts before the buds have germinated has frequently resulted in poor stands and sometimes necessitated complete replanting. This happens mainly when planting is delayed by prolonged wet weather until May when the soil is cool and the setts do not naturally grow quickly. Successful trials with mercurial dressings were described in an earlier paper (*H.A.*, 19: 592), and in the present season these results have been repeated on a substantial commercial scale. Various types of apparatus used by farmers are described and illustrated. The most recent results

suggest that while the three mercurials described in the earlier trials and a fourth, "Abavit S", all give good results in solutions containing 0.015% mercury, there is a considerable difference in their effectiveness, Aretan being the most satisfactory. The article concludes with a discussion on the costs of treatment, in which it is pointed out that it represents only 5% or less of the total cost of planting.

1117. HOLLOWAY, T. E.

**Thoughts on the control of the sugar cane borer.**

*Sugar J.*, 1948, 11: 5-6, from abstr. *Int. Sugar J.*, 1949, 51: 73.

Observation shows that there are three zones of infestation [in Louisiana?]: a zone of heavy infestation on the highest lands, a strip one or two fields wide of medium infestation, and a zone of low infestation on the low land lying close to swamp. Land with big, clear drainage ditches is associated with high infestation and, conversely, ditches shallow and stopped up show low infestation. These observations are linked with the siting of larvae and pupae in the winter, in or on the soil. Water, in fact, kills the larvae. It is suggested that drainage, though necessary, may be too fast, and that it is advisable during this season to hold the water on the land, one of the means to which end would be the retention of trash.

1118. VINSON, J.

Note sur le borer ponctué, *Proceras sacchariphagus* Bojer (Lep. Pyralidae).  
(Note on the sugar cane borer, *P. sacchariphagus*.)

*Rev. agric. Maurice*, 1949, 28: 172-5, bibl. 6, illus.

*Proceras sacchariphagus* is the old name of the sugar cane borer in Mauritius and has been re-adopted. It is compared morphologically with strains of the same species found in Java and with the distinct species *P. venosatus* found in Ceylon.

1119. BYNUM, E. K., INGRAM, J. W., AND CHARPENTIER, L. J.

**Control of wireworms attacking sugar cane in Louisiana.**

*J. econ. Ent.*, 1949, 42: 556-7.

In some areas in Louisiana wireworms so deplete the stand of cane planted in the autumn as to cause heavy losses of the plant-cane crop and make it unprofitable to retain the fields as ratoons. Experiments and observations reported here show that summer-planted cane suffers little injury when planted in areas badly infested with wireworms. In such areas, therefore, cane should be planted in early August when practicable. The results of one experiment indicate that most of the wireworm injury to autumn-planted cane may be prevented by applying 400 lb. of dust containing 1% of chlordan or toxaphene or 0.2% of gamma benzene hexachloride per acre in the furrow with the setts at the time of planting.—Bur. Ent. Pl. Quar. U.S.D.A.

1120. WILSON, G.

**Progress of "Gammexane" trials [on sugar cane].**

*Cane Gr. quart. Bull.*, 1949, 13: 75-8.

"Gammexane" is being used on a large scale by



Queensland cane growers to control greyback grubs. The latest trials indicate that broadcasting over the land requires the use of about three times as much insecticide as when it is applied in a band 20 inches wide along each row of cane. Mechanical methods of applying it thus are receiving further attention. Other experiments, presumably with the dust broadcast, showed that where 75 lb. per acre and upwards was applied to plant canes residual toxicity lasted into the first ratoon crop, but to ensure protection it is suggested that 100 lb. per acre be applied on heavy soils and 125 lb. on light and medium soils. Trials on first ratoons not previously treated showed most effective control when the dust was applied in furrows 3-4 inches deep on either side of the rows at rates of 75 to 100 lb. per acre. Comparing methods of application, drilling the "Gammexane" at rates of 50 to 200 lb. per acre proved more effective than discing or ploughing in.

### Tea.

(See also 1191.)

#### 1121. SOETARDI, R. G.

Beschadiging van thee door een sabelsprinkhaan (*Holochlora pygmaea* Karny). (Damage to tea caused by a long-horned locust.) [English summary 12 lines.] *Bergcultures*, 1949, 18: 525-7, illus.

In 1941, on the Goalpara estate in West Java, the locust *Holochlora pygmaea* was recorded for the first time as causing damage to tea. The damage was serious, the youngest leaves being eaten, the shoots between the first and second leaves partially severed, and twigs of less than 1 cm. in diameter split by the egg-laying activities of the female. Derris dusts appeared to give no control. Data on the biology of the insect are given. The eggs were heavily attacked by an unidentified hymenopterous parasite.—C.P.V. Research Station, Java.

#### 1122. KINGDON-WARD, F.

Does wild tea exist?

*Nature*, 1950, 165: 297-9, bibl. 1.

It is suggested that the Assam and Cambodia races of tea may have had a common origin in the north-east corner of Assam, "where the divergent threads of the great rivers are gathered together", while the China race is likely to have evolved from a separate ancestor. The dispersal of tea may possibly be identified with the historical records of Thai migrations. A map illustrates the author's hypothesis on the primary and secondary centre of diversity and on the later distribution of the species.

### Sundry crops.

(See also 773-775, 776h, i.)

#### 1123. JOSHI, N. V., AND JOSHI, S. G.

The "Band" disease of areca palm.

*Indian Fmg.*, 1949, 10: 197-200, bibl. 2 in text.

In Mysore the betel-nut or areca palm, *Areca catechu*, has become increasingly affected by the "band" (barren) disease in recent years, some districts showing 50% or more of the trees affected. In diseased palms

the leaves, darker green than usual, become progressively smaller, and in some cases the petioles remain packed round the stem, preventing normal development of the growing point; fruiting, as the name signifies, ceases. No causal organism has been found, although the possibility of a virus being responsible is not altogether excluded. Bacteriological studies of soil samples taken from beneath healthy and diseased trees showed somewhat higher counts of micro-organisms from the former, but no conclusions are drawn. Spectrographic examination of the soil samples showed varying quantities of several trace elements with the exception of zinc, which was consistently lower in the "band" diseased samples. Applications to the soil of about 25 grams each of borax and sulphates of copper, manganese and zinc on top of a basic dressing of NPK did not, however, lead to a definite recovery of slightly or wholly affected trees. Mn caused further deterioration, Zn a marked temporary improvement, B a slight temporary improvement, and Cu a slight improvement after a lapse of some time; the four elements together produced a more lasting improvement than any one of them alone. The authors conclude that further studies should be carried out along the same lines.

#### 1124. ABRAHAM, P.

Vegetative propagation of cinchona in South India.

*Indian J. Hort.*, 1946, 4: 16-26, bibl. 9, illus.

[received 1949].

Three methods of budding and four methods of grafting were compared for several seasons at Coimbatore. Budding methods were a modification of the Jaffna patch budding method, the Forkert method and shield budding. With budding done in October 1941 on seedling stocks with an average girth of 3 inches, percentage successes were patch 75-2, Forkert 10-0 and shield 5-7. Comparable results were obtained in further buddings from January to April 1942. Further trials were made with patch budding only in 1943 and 1944, and in 1944 several hundred plants were budded in each month except the four wettest, the percentage success ranging from 81 to 95. Grafting methods tried were the side graft (Nakamura method), the bark side graft, the wedge and the saddle grafts. After preliminary difficulties had been overcome side grafting onto seedlings of pencil thickness proved the most satisfactory, percentage success ranging from 47 to 74 for open field and nursery stocks respectively. The need for liberal watering in dry seasons was, however, made apparent, and in the case of nursery grafted stock it will be necessary to evolve a satisfactory method of transplanting to the field. Throughout the trials clonal scion material was obtained from *Ledgeriana* type trees with bark samples containing over 8% anhydrous quinine sulphate.

#### 1125. LEROY, J.-F.

Les mûriers sauvages et cultivés. La sériciculture sous les tropiques. (Wild and cultivated mulberries. Silk production in the tropics.)

*Rev. int. Bot. appl.*, 1949, 29: 481-96, bibl. 39.

A review of the literature on mulberries; their botanical classification, structure, cytology and distribution, with

notes on the development of *M. alba* in the tropics and on the prospects of extending silk production in the French Colonies.

1126. REITSMA, J., AND HADIWIDJAJA, T.

Handleiding voor het kweken van de rijst-champignon (*Volvaria volvacea* (Bull.) Quélet). (Directions for the culture of the mushroom, *Volvaria volvacea* [in Java].)

Landbouww, 1949, 21: 558-64, illus.

Warm, moist districts, with an average day- and night-temperature of 25-30° C., are especially suitable for the culture of this "rice" mushroom. In rainy districts, such as that of Buitenzorg, a crop can be grown the whole year round, and with careful shading and watering this may also be achieved in dry, warm areas. An average temperature of below 25° C., however, seriously limits production. The mushrooms are grown on beds built of bundles of rice ears, and sometimes also rice straw, neatly packed to form a heap with gently sloping sides. Between each double layer is spread a layer of ashed rice husks mixed with unburnt husks to promote heating. A detailed account is given of the construction of the beds, the production of spawn, methods of inoculation, management and harvesting. A yield of 2-4 kg. per running metre of bed can be expected during the first 2 months of bearing. After 2 months, beds should be renewed. A continuity of cropping may be obtained by maintaining 6 beds, which are spawned in succession at intervals of 10 days.

1127. CHOUDHURY, S.

Black pepper growing in Assam.

Indian Fmg, 1947, 8: 557-9 [received 1949].

Black pepper (*Piper nigrum*) is only grown on a limited scale in Assam, although the climate and soil are suitable. The most satisfactory method of propagation is by cuttings 1-2 ft. long, taken from the upper part of bearing vines and planted in a nursery bed. Frequent watering and shading with leaves or thatching grass is necessary. Cuttings are planted out at the beginning of the rainy season at the foot of trees or supports up which they are to grow. Liberal manuring is required, and a mixture of cow-dung, compost and oil cake gives good results. Yields in Assam are low but could be considerably increased by the selection of suitable vines, well provided with stamens, and by adequate manuring.

1128. AGNIHOTRI, B. N.

Turmeric.

Indian J. Hort., 1949, 6: 3/4: 28-31.

A popular account of the cultivation and preparation for market of turmeric, which is the name given to the fresh or dried rhizomes of *Curcuma longa*. It yields both a condiment and dye.

1129. HIBON, E.

Les vanilles des établissements français de l'Océanie. (The vanillas of the French Pacific colonies.)

Rev. agric. Réunion, 1949, 49: 113-26.

A general account of the vanilla industry of the French Pacific islands, which now produce 10% to 15% of the world's supply. Brief descriptions are given of the following varieties of *V. planifolia*: Tahiti, Papenoo, Tiare (Tiarei), Mexican (Bourbon) and Potiti. The Tahiti type, which is apt to throw "sports", and to a lesser extent Papenoo and Bourbon are the commercial sources of vanilla. Soils, host plants and methods of growing the crop and preparation of the pods for market are outlined, and improvements suggested.

### Noted.

- 1130.

- a BRAAK, H. R.

Coagulum-transport naar centrale crepe-fabrieken. (Coagulum transport [from the plantations] to central crêpe factories.)

Bergcultures, 1949, 18: 490-507.

- b ELLIOTT, J. T., AND PEMBROKE, E. A.

History of sugar in the Mackay District [of Queensland].

Cane Gr. quart. Bull., 1949, 13: 66-71.

- c GERMAIN, R.

Reconnaissance géobotanique dans le nord du Kwango. (An ecological survey of the northern Kwango district.)

Publ. Ser. sci. Inst. nat. Ét. agron. Congo belge 43, 1949, pp. 22, bibl. 7, illus., 25 fr.

- d LINDBERG, G., AND MOLIN, K.

Notes on the physiology of the cacao parasite *Marasmius perniciosus*.

Physiol. Plant. Copenhagen, 1949, 2: 138-44, bibl. 8.

- e MICHELMORE, A. P. G.

Report on coffee entomology and pathology 1946-48, 1949, Entebbe, Uganda Protectorate, pp. 15.

## STORAGE AND PLANT PRODUCTS.

(See also 844, 1198.)

### General.

1131. THISTLE, M. W.

History and work of the Canadian Committee on Food Preservation.

Reprinted from *Food in Canada*, March to June, 1949, pp. 12.

An outline is given on pp. 5 and 6 of the work done by what is now the Department of Agriculture Committee on Fruit and Vegetable Preservation. Investigations

have been carried out on the following, among other subjects: tomato storage and ascorbic acid content, apple storage and methyl bromide fumigation of stored apples, vitamin C in apples, storage of celery, freezing storage of asparagus, brown rot of peaches, dehydration of vegetables and fruit. The personnel of the committee is drawn from the Dominion Stations at Kentville, Morden and Summerland; from Macdonald College, Quebec, and Ontario College, Guelph; from the Science Service Experimental Farms, and the



Marketing Service of the Department of Agriculture, Ottawa; and from the Laboratory of Hygiene, Department of Health and Welfare, Ottawa.

1132. CARLSEN, E. W., AND OTHERS.

**Packaging studies in simulated transit with apple boxes.**

[Publ.] *Washington State Apple Commission*, 1949 [or 1950?], pp. 9.

A study of the efficiency of packing methods and materials commonly used by the Washington State apple industry was made during the season 1948-49. It was found that padding was most effectively used at the following points, in order of importance: (1) the lid of the box, (2) the bottom, (3) a tier pad in the middle, (4) the sides, and (5) a tier pad between all layers. The addition of a tier pad between each layer may not be advisable for smaller-sized apples. The heavier tier pads were in general more effective in preventing bruising, and had the additional advantage of replacing enough fruit in the pack to compensate for the cost. There is some indication that they tend to increase the bruising against the sides of the box, although they decrease the total number of bruises. The lighter pads tended to increase bruising caused by pressure against adjoining apples. The addition of a heavy liner reduced the bruising caused by pressure of apples against each other as well as against the box.

1133. DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, FOOD INVESTIGATION.

**The Ditton Laboratory and the Covent Garden Laboratory.**

[Publ.] *D.S.I.R. Lond.*, 1949 (?), pp. 12, illus.

Ditton Laboratory was established in 1930 close to the East Malling Fruit Research Station to study storage problems of fruit and vegetables on a semi-commercial scale. Its main present objectives are discussed. The Covent Garden Laboratory is a sub-station of Ditton.

1134. VANWUNGAERDEN, G.

**La recherche scientifique et la conservation des fruits en Belgique. (Scientific research and fruit storage in Belgium.)**

*Courr. hort.*, 1950, 12: 27-30, 96-8, illus.

The problems of fruit storage are being studied in Belgium from the points of view of morphology, physiology, biochemistry and mycology of the fruit stored. During the course of the investigation it was found that there was great diversity in the samples tested and it was deemed necessary to study the quality of the fruit as influenced by pomological operations, by the soil conditions, and by manuring. These points are elaborated. Under Biochemistry are included tables showing chemical analyses of commonly grown apple varieties, and the optimum conditions for storing certain varieties of apples and pears. Under Mycology are discussed not only fungal diseases but also functional disorders. Cold storage installations and conditions during storage are mentioned.

1135. TURNER, J. F.

**The metabolism of the apple during storage.**

*Aust. J. sci. Res., Ser. B, biol. Sci.*, 1949, 2: 138-53, bibl. 39.

A survey has been made of changes in amounts of certain metabolites and possible respiratory intermediates in the flesh of Australian Granny Smith apples

during storage at 0° C. Respiratory activity shows two peaks and carbohydrates form the predominant substrate for respiration. Evidence indicates that a carbonyl compound of low molecular weight may be an intermediate in carbohydrate metabolism. Fluctuations in total organic acids, malic acid, and citric acid suggest that the tricarboxylic acid cycle of Krebs may operate in carbohydrate oxidation in the apple. Ascorbic acid, which decreases during storage, and oxalic acid, which remains constant, do not fluctuate significantly with the respiration rate. Total nitrogen remains approximately constant during storage, but there is an appreciable synthesis of protein. This synthesis appears to be related to the large reserves of available carbohydrate and is dependent on the level of respiratory activity. [Author's summary.]

1136. SMITH, E.

**Picking maturity and the refrigeration of apricots.**

*Proc. 45th ann. Mtg Wash. St. hort. Ass.*, 1949, pp. 167-73, bibl. 3.

Studies made on the Wenatchee Moorpark apricot in 1936, 1937 and 1949 are described. In the earlier tests fruit at different stages of maturity were held for 10 days at 40° F. before ripening at 75° F.; in the recent trials fruit was held at 31° and 36° F. for 3½ days, then at 36° F. for 9 days before ripening. Results show that fruits picked green and pale green were of very poor dessert quality on ripening, but fairly satisfactory for home canning; fruits picked when the apricot colour had developed except at the sutures ripened with good flavour, but became over-ripe after 3 days. Fruits of intermediate maturity with greenish lemon-yellow skin colour were the most satisfactory; they did not have full flavour on ripening but were acceptable and were also satisfactory for canning. The suggestion is made that apricots be sorted into 3 groups on a basis of apparent maturity, and be packed separately, the ripest for rapid distribution in near-by markets, and the others for more distant markets, the less mature being designated as cooking or canning fruit. The tests also showed that the belief that storage below 40° F. resulted in flesh discoloration was false; fruits of 3 varieties subjected to 31° F. for pre-cooling and held at 32° F. showed no injury to the flesh and ripened with better quality than fruit stored at 40° or 45° F. Losses in weight of fruit recorded were 2% in 24 hours in the packing house, 4.3% during subsequent refrigerator storage and as much as 8.7% in the greener lots during ripening compared with 6.7% for the more mature lots ripening in 3 days.

1137. SMITH, A. J. M.

**A dual temperature method for the refrigerated carriage of plums.**

*J. hort. Sci.*, 1950, 25: 132-44, bibl. 10.

The dual temperature method now used as a standard practice in refrigerated carriage of South African plums to England consists of pre-cooling the fruits immediately and quickly to as near 31° F. as is practicable, carrying them for 4 or 5 days on ship at this temperature and then raising the temperature to 45-50° F. according to variety. The experimental work on which the method is based was carried out in the years 1937 to 1940 and is here described. The varieties concerned

are chiefly the Santa Rosa and the Kelsey, other less important ones being Gaviota, Wickson, Prune, etc.

1138. FIDLER, J. C.

**Studies of the physiologically-active volatile organic compounds produced by fruits: II. The rate of production of carbon dioxide and of volatile organic compounds by King Edward VII apples in gas storage, and the effect of removal of the volatiles from the atmosphere of the store on the incidence of superficial scald.**

*J. hort. Sci.*, 1950, **25**: 81-110, bibl. 19.

In this work at the Ditton Laboratories, King Edward VII apples were stored in 8½% CO<sub>2</sub> and 13% oxygen in 4 different stores. Three held unwrapped apples and one apples in oiled wrappers. Two of the stores of unwrapped apples were fitted with filters to remove volatiles. In one of them the filter removed the odorous fraction only, in the other ethylene as well. Results, which are considered in detail, indicate that the removal of volatiles by circulation of the atmosphere through filters is unlikely to be complete in a commercial scale store. Only when ethylene was also removed was there any appreciable reduction in superficial scald. Oiled wrappers provided a much more efficient control of scald than the filters. It is concluded that one of the causal factors of scald is a substance of very low volatility at the temperature of storage which can only be removed by agents in contact with or very close to the skin. It is suggested that scald can only occur when this "factor Y" which is volatile and another "factor X" not volatile are both present. [From author's summary.]

1139. HULME, A. C.

**The storage of apples. Interim report on skin-coatings.**

*Tech. Pap. D.S.I.R. Food Invest.* **1**, 1949, pp. 28, bibl. 4, illus.

A résumé is given of the work carried out by the Food Investigation Organization on "apple-dips" or skin-coatings prior to 1947. In 1947, 50 tons of Cox's Orange Pippin apples were sprayed with an oil-emulsion and then stored in a commercial cold store at 40° F. (5° C.). The results of this trial are the main subject of this report. A description of the results of this trial is divided into two parts. The first part of this report is confined to an analysis of the wastage in treated and untreated fruit while in the second part an attempt is made to correlate these losses with the composition of the internal atmosphere of the coated fruit. Evidence is produced that the following factors influence the behaviour of the coated fruit in storage: maturity and temperature of the fruit when the coating is applied; degree of emulsification of the skin-coating when applied; oil-concentration in the coating emulsion. It is shown that, in so far at least as the last three of these factors are concerned, their effect on storage behaviour is a result of their influence on the concentration of CO<sub>2</sub> and of O<sub>2</sub> inside the apple. The onset of alcoholic disorders is shown to be correlated with the O<sub>2</sub>-concentration inside the fruit. Skin-coating is shown to reduce the weight loss from fruit by almost 5 bushels per ton of fruit over a period of 5 months at 40° F. (5° C.). Structural details are given of the machine

used to apply the coating to the surface of the fruit. [Author's summary.]-Ditton Laboratory, E. Malling.

1140. BOUGARD, M.

**L'emploi des papiers huilés fongiques pour la conservation des fruits. (The use of oiled paper impregnated with a fungicide for the protection of stored fruit.)**

*Courr. hort.*, 1949, **11**: 694.

With notes on the use of copper sulphate, iodide of potassium, diphenyl, *o*-phenyl-phenol, and hexamine.

1141. BILLARDON, R.

**Conditions particulières d'établissement des installations frigorifiques destinées aux climats tropicaux. (Special requirements of refrigerating plants to be used in the tropics.)**

*Fruits d'outre-mer*, 1949, **4**: 321-6.

This, the second of two articles on refrigerating machinery for the tropics, deals mainly with the choice of compressors, refrigerating fluid and condensers. [The first article by the same author, *Ibid.*, 1947, **2**: 107-13 dealt with general questions.]

*Plant products.*

(See also 1176.)

1142. RASMUSSEN, M. P.

**Consumer purchases of fresh fruits at retail.**

*Bull. Cornell agric. Exp. Stat.* **851**, 1949, pp. 33.

Oranges, grapefruit, apples and bananas account for some 80% of all fruit purchases in representative New York retail stores. If one adds peaches, lemons, various types of melon, pears, strawberries and grapes, over 97% of fruit purchases are accounted for. The monthly variations in demand are noted.

1143. KERVÉGANT, D.

**Valeur nutritive de certains aliments.**

(Nutritive value of certain foods.)

*Rev. agric. Réunion*, 1949, **49**: 149-56, 203-15.

Although the article is partly concerned with animal and cereal products, tables are given showing vitamin content and Ca, Mg, P, and Fe contents of many tropical fruits and vegetables. [As the author is Chief of the agricultural service in Martinique the figures are presumably based on analyses made in that island.]

1144. ATKINSON, F. E., AND STRACHAN, C. C.

**Small canneries.**

*Publ. Dep. Agric. Canada* **828**, being *Tech. Bull.* **75**, 1950, pp. 83, illus.

This bulletin deals in great detail with the smallest scale of commercial canning operation up to a single mechanical line, which is recognized as the top of the small cannery group. It is copiously and clearly illustrated and should be of great value far beyond Canada. Suitable varieties for canning in British Columbia and Eastern Canada are discussed for apricots, cherries, peaches, pears, prunes, raspberries, strawberries, tomatoes, asparagus, beans, beets, carrots, corn, peas and spinach, together with their harvesting and preparation for canning. The actual processes are considered at length.



1145. KRISHNAMURTI, C. R., AND GIRI, K. V.  
Preparation, purification and composition of  
pectins from Indian fruits and vegetables.  
*Proc. Indian Acad. Sci., Sect. B*, 1949,  
29: 155-67, bibl. 16.

This paper is primarily concerned with different analytical procedures, the conditions needed for the preparation and purification of pectins and variations in the property of forming jellies in the presence of sugar and acid. Moisture and pectin contents are tabulated for the following: Papaya fruit both ripe and unripe, Jack fruit, sweet melon, tamarind fruit pulp, tamarind seed, Indian gooseberry (*Phyllanthus emblica*), plantain, guava, sweet pumpkin, cucumber, ash pumpkin (*Lagenalia vulgaris*), lemon, orange, locust bean. The results obtained indicate that a wide scope is offered by indigenous plant materials for the preparation of high-grade pectins. It would appear, however, that the mere presence of pectin in any material does not necessarily confer on it the property of forming jellies; it seems likely that jellying power is associated with either the uronic anhydride content or methoxyl values of the pectins.

1146. KLOSE, A. A., AND OTHERS.  
Ascorbic acid from walnut hulls.  
*Industr. Engng Chem.*, 1950, 42: 387-91,  
bibl. 10.

In pilot-plant-scale extraction operations 25-50% crystalline ascorbic acid was recovered from waste green walnut hulls. Experimental details of the process are presented. The operation promises to be economically attractive only where other use can be made of the equipment during the off-season.—Western Regional Res. Lab., Albany, Calif.

1147. RAO, U. N.  
Curing the persimmon (*Diospyros kaki*).  
*Indian J. Hort.*, 1945, 3: 8-13, bibl. 7  
[received 1949].

Several astringent varieties of kaki were introduced to S. India some years ago and have grown and fruited well, but have been unpopular because they have remained astringent up to the point at which decomposition sets in. Various methods used elsewhere for removing astringency in stored fruits were tried on a limited scale at Coonoor, but though some improvement was apparent all had disadvantages which made their wide application impracticable. By chance, however, it was discovered that if kaki fruits were kept in association with mature Kieffer pears in airtight containers they ripened in 3 to 5 days.

1148. NAYAR, T. G., AND SHETTY, K. M.  
A note on curing of persimmons (*Diospyros kaki* L.F.).  
*Indian J. Hort.*, 1949, 6: 1: 30-5, bibl. 3.

Further experiments to those noted above in abstract No. 1147, indicated that in addition to pears, ripe fruits of bananas, tomatoes, mangosteens, passion fruit and Cape gooseberries packed in closed containers with 4 varieties of kaki produced ripening and loss of astringency in the latter within a few days. The quantity of catalytic fruit used had no effect on the time the kakis took to ripen, but ripening was hastened by using fully ripe catalytic fruits as opposed to fruits that were merely mature. Without any treatment kakis ripened in about 21 days compared with about 3 days

for treated fruits, and during this relatively long period fruits that had even slight injuries tended to go bad.

1149. LOUSTALOT, A. J., AND CERNUDA, C.  
Experimentos de la curación de la vainilla  
en Puerto Rico. (Experiments on vanilla  
curing in Porto Rico.)  
Reprinted from *La Hacienda N.Y.*, Dec.  
1948, pp. 50-1, illus.

Figures are given showing how the production of vanilla in Porto Rico has steadily increased since 1936. The curing process has been studied at the Federal Experiment Station for the last 12 years. Various methods of killing the pods were investigated. Of these, the Guadeloupe method, in which the pods are scratched with a pin, gave the best results if antiseptic conditions could be maintained. Submerging the pods in hot water is probably the simplest method, but results in a low vanillin and phenol content. Exposure to ethylene gas was not found satisfactory. Crushing or slicing the pods before curing to increase aeration did not materially affect the quality of the vanilla extract. The moisture content of cured pods affected the aroma but not the vanillin content; those with a 31-34% moisture content were both pliable and had the desired aroma. Pods conditioned at 45° C. had a stronger aroma than those held at lower temperatures, and could, moreover, be cured in only 3 months. Finally it was found that the vanillin content of the pods bore no relationship to the quality of the extract, for other substances besides vanillin contribute to the taste and aroma of the extract. For this reason genuine vanilla extract is superior to the synthetic product.

1150. IYENGAR, B. R. Y., AND KRISHNAMURTHY, S.  
Dielectric constants of cashew shell oil.  
*Curr. Sci.*, 1949, 18: 403, bibl. 5.

The dielectric constant of cashew shell oil (4.6) is comparable to that of castor oil but decidedly higher than the constants of coconut, linseed, olive, poppy seed, perilla, rape seed, sesame and tung oils (3.0-3.6). Complete details are being published elsewhere.

1151. ANDERSON, E.  
Endosperm mucilages of legumes.  
*Industr. Engng Chem.*, 1949, 41: 2887-90,  
bibl. 25.

Mucilage from guar (*Cyamopsis tetragonolobus*) appears to be a promising substitute for carob mucilage.

1152. BEELTJE, E. J., AND DE BOER, G.  
De bruikbaarheid van teepol in de rubber-  
bereiding en de latex-industrie. (The use  
of Teepol in rubber preparation and in the  
latex industry.)  
*Bergcultures*, 1949, 18: 419-23, bibl. 4.

The response of rubber latex to treatment with the Shell product Teepol was carefully studied in a series of experiments. It is concluded that Teepol cannot be used effectively as a coagulant or anti-coagulant, but that it has value as a stabilizer, as a dispersing agent, and for hastening the process of creaming.—Indonesian Institute for Rubber Research.

1153. *Noted.*  
a POTTER, A. L., HASSID, W. Z., AND JOSLYN,  
M. A.  
Starch. III. Structure of apple starch.  
*J. Amer. chem. Soc.*, 1949, 71: 4075-7, bibl. 10.

## NOTES ON BOOKS AND REPORTS.

*Books and reports.*

1154. BREWER, H. C. [Editor].

*Bibliography of the literature on the minor elements and their relation to plant and animal nutrition.*

Chilean Nitrate Educational Bureau, Inc., New York, 1948, 4th Edition,\* Vol. 1, 1948, pp. 1037.

This imposing volume testifies to the great interest that scientists have taken in recent years in the minor elements in relation to plant nutrition. This edition, of about 10,000 abstracts, "is intended primarily for the use of institutions and scientists engaged in agricultural and nutritional research". It includes all material published in the eight previous volumes, together with some new material, and may be considered to be complete as on 30 June, 1947. The 45 elements included are taken in alphabetical order, and are followed by 16 pages of unclassified abstracts. There are 4 indexes, viz. author, element, general nutrition, botanical; in the last the plants are indexed under their common names. The abstracts (many of them 20 to 50 lines long and one occupying about 1½ columns) are in two columns, the numbers in the indexes referring to columns, which are all numbered. It is obvious that this book should be acquired by all science, agricultural, and horticultural libraries and, when possible, should be at hand for ready reference by all biochemists.

1155. BUTLER, E. J. AND JONES, S. G.

*Plant pathology.*

Macmillan & Co., London, 1949, pp. 979, illus., bibl. copious, £3 3s.

Mycologists and plant pathologists will remember E. J. Butler's *Fungi and Disease in Plants* published over 30 years ago. Its sub-title was "An introduction to the diseases of field and plantation crops, especially those of India and the East", and botanists working in the tropics must have found it invaluable. When the author returned to Britain from India he started to revise that book, elaborating the general part and substituting for the tropical diseases of the second part those which are important in Great Britain and those common in other countries. Sir Edwin did not live to see the work in its final form and the task of its completion fell to his collaborator, Dr. J. G. Jones. Printing and publishing difficulties caused delay and the book did not appear until 1949. The general plan is that of the original, the first part giving an account of the general principles underlying plant diseases and their control, while the second describes selected diseases of all classes of crops.

Part I discusses such subjects as the relationship of the parasite and its host, resistance and susceptibility, the influence of environmental and nutritional conditions on plant diseases, the principles of disease control, virus and deficiency diseases of plants, and it closes with a classification of the fungi, indicating the chief genera. In this general part the bacteria in relation to plant diseases receive only brief mention (19 lines), though specific bacterial plant diseases are mentioned later. Virus diseases and deficiency disorders of plants received more extended treatment (41 and 34 pages respectively) and the fungi are described at length, with

\* For supplements to 3rd edition, see *H.A.*, 15: 924; 18: 765.

sections on their vegetative structure, reproduction, polymorphism, dissemination, nutrition, mechanism of feeding, enzymes and symbiosis (particularly with reference to mycorrhiza).

Part II describes particular diseases, and horticulturists are well served here. Chapters XIV, XV, and XVI deal with diseases of vegetables (including tomato), fruit, ornamental and miscellaneous plants (including hop), while Chapters XII and XIII describe diseases of plants which are grown both as field and as garden crops, e.g. potatoes, root crops, beans and peas. Other chapters are on diseases of cereals, pasture and forage crops and trees. As this part (occupying 600 pages) describes "Selected Diseases" only, it follows that many interesting diseases are not mentioned. Some of considerable economic significance, however, are also omitted, e.g. swollen shoot of cacao (recently considered by a special commission of inquiry [*H.A.*, 19: 1536]), verticillium wilt of hops, and walnut bacterial blight (walnut being regarded only as a timber plant).

In the preface it is stated that this book has been framed to meet the requirements of students of mycology, plant pathology, agriculture, horticulture and forestry. It would serve this purpose admirably, if only students could afford to buy it. It should, however, be available for reference in every library accessible to biological students. A striking feature is provided by the lavish illustrations from photographs obtained from various sources, and original drawings, to show fungous structure, morbid anatomy of plant tissues and symptoms of plant diseases. Each chapter ends with a bibliography which will enable the student to probe further into any particular line of the general subject. The volume is one that students and specialists alike will appreciate as bringing together the various aspects of plant pathological science, and advisory officers, concerned as they are with maintaining and improving crop production, will also do well to consult it.

H.W.

1156. CHANDLER, W. H.

*Evergreen orchards.*

H. Kimpton, London (printed in America), 1950, pp. 452, bibl. 687, figs. 66, 42s.

In 1942 the same author, who as Emeritus Professor of Horticulture in the University of California needs no introduction to horticulturists, produced *Deciduous Fruits* (*H.A.*, 13: 336), and in this companion volume he now turns his attention to the fruit and plantation crops of the tropical and sub-tropical zones. In doing so it is not his intention to supply a textbook of appeal only to the students of horticulture in hot countries. For them and for intelligent growers of these crops it should serve as a useful introduction and guide around which to build their knowledge in the light of their own specialized or local knowledge, but as Chandler says in his preface, the appeal is meant to be much wider. "It is written with the hope that all good students of tree horticulture will want to see as much of the world as possible through their special field of study, and become acquainted with as much different tree behaviour as possible." The behaviour and responses of many tropical species are frequently different from, or much more pronounced than, those of temperate-zone trees. Much interesting research



work, often of a high order, has been done upon these crops, but at present it seems to be largely ignored by American teaching, and the same can fairly be said of much teaching in other countries. Students of temperate horticulture who take the trouble to read the book will be rewarded with much information on problems akin to their own, and with new approaches to those problems.

The book is eminently readable. References to the lengthy bibliography, which even so is limited to papers published in English, are made in small type at the ends of paragraphs and do not distract attention from the text. The narrative is continuous and apart from some excellent photographs and a few diagrams, is not interrupted with tables or footnotes.

Three chapters are devoted to the general behaviour of the tree and its fruit, to orchard environment and to the growing and training of evergreen trees. Much that appears in this section is applicable also to temperate tree crops, but there is also much that is not. Thus the reader will learn of tree damage not only by freezing but also from excessive heat; he will find not only methods of propagation practised in temperate countries but also, fully illustrated, accounts of those used exclusively for evergreens. Among the fruits described, citrus, as might be expected, receives the most attention. Five chapters deal with the genus: one general, and one each on acid citrus fruits, the pummelo and grapefruit, oranges, and citrus relatives. A chapter is devoted to the avocado and another to the pawpaw. Tea, coffee and cacao are discussed in a single chapter, not because they are in any way related, but because they have a similarity of interests for temperate-zone readers. The annonas and myrtle fruits are treated briefly as are also the sapodilla and certain leguminous fruits. There is a chapter on the litchi and its relatives, and another on the mango and the cashew. Brief descriptions are given of various nuts, some like *Macadamia*, the Australian nut, and the Pili nut not widely known, and others like the Brazil nut known throughout the world, though to this day it remains largely a wild product of the Amazon valley. Other crops to which chapters are devoted are the olive, the date, the coconut and African oil palms, and the banana.

The work cannot, except in a very general sense, be regarded as a book of reference, but what the author does is to summarize, clearly and concisely, the behaviour of a wide range of trees and the ways in which their behaviour has been controlled to serve the interests of man. It cannot fail to interest the student of horticulture, and, what is more, to make him think on the many problems that still await solution.

G.K.A.

1157. CHARLEY, V. L. S., AND OTHERS.\*

**Recent advances in fruit juice production.**  
*Technical Communication Commonwealth Bureau of Horticulture and Plantation Crops* 21, 1950, pp. 176, bibls., illus. Obtainable from Commonwealth Agricultural Bureaux, Central Sales Branch, Penglais, Aberystwyth, Wales, price 15s.

The latest knowledge on subjects in the following fields is set out: Processing and bottling, production

\* F. E. Atkinson and C. C. Strachan, C. Hunnikin, A. Pollard and W. W. Reid.

of canned tomato, apple and grape juices in Canada and U.S.A., de-aeration and pasteurization, concentration of fruit juices, citrus juice and oil extraction, vitamin fruit syrups, storage of fruit juices and syrups by freezing, factors affecting quality and nutritive value of tomato juice, vitamins in fruit juices and related products, pectin degrading enzymes and their implications in the fruit products industry, fruit juice developments in some Commonwealth countries.

1158. CHIESA MOLINARI, O., AND NICOLEA, H. G.  
*Tratado general de olivicultura. (A general treatise on olive growing.)*  
Libería "El Ateneo" editorial, Buenos Aires, 1947, pp. viii+491, bibl. 405, illus., \$ (Argent.) 21.

The extended title—"Its cultivation, diseases and pests in Argentina and neighbouring countries, and its significance in industry", indicates the scope of this treatise, which is in three parts. The first (on cultivation) describes (1) The origin of the olive and its history in America, (2) Botanical characters, (3) Ecology (relation to soil and weather conditions, and distribution of the olive in Argentina), (4) Varieties cultivated in Argentina, (5) Reproduction by seed, (6) Vegetative propagation (including an account, with illustrations, of stratifying cuttings), (7) Grafting (with illustrations of methods), (8) Nurseries, (9) Windbreaks, (10) Planting, (11) Cultivation (irrigation, manuring, pruning), (12) Harvesting the olives. Part II, describing pests and diseases, is mostly devoted to insect pests (132 pages), while diseases caused by bacteria, fungi and flowering plants, and disorders due to unfavourable environmental conditions and to deficiencies of minor elements, occupy 20 pages. The coccids are stated to be among the most injurious pests of the olive in Argentina. The third part deals with processing and marketing. The book is profusely illustrated with 303 photographs and drawings.

1159. CRAFTS, A. S., CURRIER, H. B., AND STOCKING, C. R.

*Water in the physiology of plants.*

Chronica Botanica Co., Waltham, Mass., \$6, and Wm. Dawson & Sons, London, 1949, pp. 240, bibl. 17 pp., illus., 48s.

Since water is of fundamental importance to plant life the authors have rendered a valuable service in preparing this monograph. Writing mainly for the botanist and plant physiologist, they have used their language rather than the more precise language of physical chemistry. The text runs to little more than two hundred pages, yet the bibliography contains nearly eight hundred titles and a further thirty-seven recent publications are summarized and discussed in three pages of preface. The book, therefore, is highly condensed and it is impossible to touch on more than a few salient points in a short review.

The authors point out that the functions of the plant cell, and the very existence of plant life, are likely to be bound up intimately with the properties of water and of dilute aqueous solutions, and that these properties are very unusual. For example, water has a very high heat of vaporization; great surface tension, internal pressure and dielectric constant; a minimum specific heat at 37.5° C., a maximum density at 4.0° C., and a great expansion on solidification. The development of

modern views on the structure of water is discussed; it is now generally considered that in the solid state, or ice, the molecules are arranged in a normal co-ordinated hexagonal lattice, with each oxygen surrounded by four hydrogens, and each hydrogen between two oxygens, the oxygens behaving as if they had four valencies, and the hydrogens as if they had two. In the fluid and gaseous states the structure is apparently less regular, changes with temperature, and is less well understood. Aqueous solutions are then discussed and it is pointed out that "practically every form of bond known to the chemist may be involved". Imbibition, association and hydration are considered and the importance of the hydrogen bond is stressed. Chapters on osmosis and the mechanism of osmotic pressure follow, and it is pointed out that the part played by the solvent has tended to be neglected. Gases and solids, when dissolved in water, apparently become liquids and behave as such, and, in the absence of a membrane pervious to one alone, there is no fundamental reason for regarding one as the solute and the other as the solvent. Use of the terms is a matter of convenience. Definitions are given of *osmotic pressure* (OP), *diffusion pressure*, *diffusion pressure deficit* (DPD)—a term the authors prefer to alternatives such as *suction pressure*—and *turgor pressure* (TP). Various hypotheses on the mechanism are discussed and the importance of the equation  $OP = DPD + TP$  is emphasized. Turning now to the living plant, the authors first discuss the intracellular distribution of water and the forces determining its partition between cell-wall, protoplasm and vacuole, and the evidence that protoplasm plays a more active part than was once thought. A long chapter is devoted to the osmotic quantities of plant cells, and the various methods that have been used to measure, or estimate, the values of OPs, DPDs and TPs in plant cells and tissues. The direct, or plasmotic, method of measurement of OPs has usually given higher values than those estimated by indirect methods, such as freezing point determinations. Various hypotheses to account for these discrepancies are discussed. The authors still include "under OP all forces leading to water absorption by the cell". There is a very interesting chapter on active cell water relations, where by "active" is implied "a process involving the utilization of metabolic energy". Such forces may be responsible for the discrepancies between the values of the OPs found by the direct and indirect methods and may play a part in other functions, such as transpiration, translocation and glandular secretion. They consider that the evidence for such forces is wide and increasing, but is not yet conclusive. The last two chapters deal respectively with uptake and movement of water, and its loss and retention. Under movement is included the translocation of organized food materials, and the "protoplasmic" and the "mass flow" hypotheses on the mechanism involved are discussed. Though "intended as a reference book" this monograph is much more than a mere compilation and should certainly be in every botanical library. M.C.V.

1160. FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE.  
*Woody-plant seed manual*, being *Misc. Publ. U.S. Dep. Agric. Forest Service*  
 654, 1948, pp. 416, bibl. 369, \$2.75.

This manual will be of great assistance not only to the forester but to all those who must propagate woody plants, whether they are ornamentals, fruit or nut trees. It consists of two parts. In the first [pp. 1-52] problems of seed production in general are considered, the chief headings being: seed development; seed production and dispersal; source of seed; collection, extraction and storage; treatment of seed prior to sowing; and seed testing. In the second the propagation by seed of individual species is considered separately in detail. A glossary is included and it is well indexed. Although it is stated that the work is based mainly on unpublished information, references are usefully given to nearly 400 other publications dealing with the particular species discussed. The species are also classified according to their use for the control of erosion, for shelterbelts, wild life preservation and ornamental planting. It is clearly illustrated and excellently printed.

1161. HILKENBÄUMER, F., AND OTHERS.

*Anzucht von Obstbäumen mit Veredlungsverfahren. (The raising of fruit trees, including budding and grafting techniques.)*  
 Neumann Verlag, Radebeul, Berlin, 1949,  
 pp. 87, illus.

Even the most practical textbook on fruit growing cannot hope to give such detailed advice to beginners on how to perform each phase of their work as this little brochure attempts. It consists of drawings with captions illustrating a particular technique or the use of a tool. Although the booklet is no substitute for the demonstration of a teacher or foreman, its study may save many a trainee from disgrace in the eyes of his elders.

1162. HUXLEY, J.

*Soviet genetics and world science.*  
 Chatto & Windus, London, 1949, pp. 245,  
 bibl. 43, 8s. 6d.

The violent denunciation of neo-Mendelism by Russian scientists and the startling claims of "Mičurinism" have caused much bewilderment in western countries. The two outstanding scientific claims on which the new science is based are (1) that the inheritance of acquired characters in plants has been induced by partial vernalization, and (2) that plant genetic constitution has been altered by grafting with other varieties or species. Results are not analysed in the light of existing knowledge, but are interpreted in terms of a new theory that it is possible to alter the hereditary constitution of a plant by "shattering" this constitution at some critical stage of growth so that it will "assimilate" changed conditions of environment. The lack of valid scientific evidence for these claims and the abusive rejection of the well-established and verified principles of Mendelism inevitably lead to distrust. Why, if the evidence is inadequate, do Russian scientists continue to support the theory? Why have the former supporters of Mendelism either been dismissed or humiliatingly repudiated their beliefs?

Professor Huxley, with characteristic clarity, presents the facts of the case and points out the major issues involved. This competent analysis of the controversy will be welcomed by all those, scientists or laymen, who are interested not only in the truth or falsity of Lysenko's claims but in the position of science in world



civilization. For Huxley makes it clear that the major issue at stake is an ideological one, "the official condemnation of scientific results on other than scientific grounds, and therefore the repudiation by the U.S.S.R. of the concept of scientific method and scientific activity held by the great majority of men of science elsewhere". Because Mendelism implies innate human inequality and Mičurinism postulates that the genetic constitution can be changed by environmental influences (a doctrine more acceptable to the communist way of thought, and one, incidentally, that gives greater promise of quick, practical results), Mendelism is banned and Mičurinism installed as the official party science, irrespective of scientific considerations.

Dealing with the scientific claims of Lysenko and his followers, Huxley makes a careful analysis of their experiments and shows that most of their results can be ascribed to faulty technique or lack of scientific precautions, and can be interpreted on the basis of Mendelian principles or our existing knowledge of viruses or chimaeras. But Mičurinism is now the party doctrine, and Russian scientists have to submit to it.

This analysis of the issues at stake in the Soviet genetics controversy leads on to a stimulating discussion of the position of world science in relation to the state and of the rights and duties of the scientist. P.R.-D.

1163. KOVALJ, T. A.

*The struggle against drought.* [Russian.] Gosydar. Izdat. seljskohoz, Moscow, 1949, 264 pp., illus.

This is an account of a 16-year plan, inaugurated by the Soviet Central Committee in October 1948, for improving the cultural conditions in the steppe region of southern Russia, with particular reference to planting shelter belts as an aid in conserving water for agriculture. The scheme is outlined as follows:

(a) Planting shelter belts of trees on watersheds, along the sides of fields in rotation, along slopes of valleys and ravines, on the banks of rivers and lakes, around ponds and reservoirs, and planting with trees and consolidating the soil of sandy regions.

(b) The regular organization of territories, with the introduction of "full-plant" rotation with field and fodder crops, and the rational use of cultivated land.

(c) A regular system of working the soil, care at seed-sowing, and, particularly, extensive use of fallowing, and stubble and winter ploughing.

(d) A regular system of application of organic and mineral manures.

(e) Sowing selected seed of high yielding varieties adapted to the conditions of the particular region.

(f) Development of irrigation, making use of local water supplies by the construction of ponds and reservoirs.

These points are elaborated in the first chapter. Reference is made to the higher yields that have been obtained (with cereals) on fields protected by shelter belts. One effect of the shelter belts is that they check erosion caused by the water from melting ice and from rain. Suitable trees for these shelter belts are oak, associated with maple, elm, birch and, in some regions, apple, pear, apricot, and steppe cherry. Bushes recommended are yellow acacia, honeysuckle, hazel,

etc. Where fruit trees are included they may be planted at the rate of 10% to 15%. In certain regions of the Crimea and southern Ukraine eucalyptus can be planted along irrigation canals and around ponds and reservoirs as well as in the shelter belts. The spacing of trees in the shelter belts should vary according to the topography of the ground. Reference is made to forest nurseries and to implements needed in them. Maps show the lay-out of the proposed shelter belts. Other chapters describe the work of the Russian agronomists, Dokyčev, Kostyčev, Izmail'skii, and Viljams and the horticulturist Mičurin, in relation to protection against drought.

1164. KRAMER, P. J.

*Plant and soil water relationships.* McGraw-Hill, N. York, Toronto, Lond., 1949, pp. 347, bibl. approx. 650, illus., 38s. 6d. or \$4.50.

The author's attitude is summed up in his preface thus: "Considerable attention has been given to the application of the basic physical and physiological principles in explaining plant growth. While knowledge of plant processes has an intrinsic scientific value, it attains maximum usefulness only when it is related to the growth behaviour of plants. Investigations in the various fields of applied plant science cannot be very productive unless they are based on a thorough understanding of the fundamental principles involved. It is hoped that this book will assist plant scientists to understand better the principles governing plant and soil water relations and to see how this knowledge can be used to solve problems of plant growth."

The book opens with a historical introduction showing how the influence of Aristotle, who postulated the existence of a vital principle in plants controlling their nutrition, affected thought on the subject up to the middle of the nineteenth century. The discovery of osmosis dealt vitalism a heavy blow, but "in recent years it has become apparent that the intake of water and solutes cannot be explained solely in terms of the chemical and physical processes of individual cells, for these processes are at least partly controlled by the organism as a whole". As late as 1946 the well-known Danish physiologist, August Krogh, described himself as a vitalist, and Kramer concludes that "consideration of these shifts in viewpoint during the past century should make us cautious about ridiculing some of the apparently erroneous views held a century ago".

Sufficient has been said to indicate that the subject is treated in a broad-minded spirit of inquiry and without rigid adherence to preconceived notions arising from the author's own work. Here and there, where opinions are found to differ, the author has indicated what seems to him to be the most logical conclusions, but he appreciates that some specialists will inevitably express disagreement. This attitude enhances the value of the book, for the subject does not exist upon which the last word has been written.

A fair idea of the book's contents and the treatment of the subject can be obtained from the chapter headings: Soil-moisture relations, Factors affecting the supply of soil moisture, Measurement and control of soil moisture, Structure and growth of roots, Factors affecting the development of root systems, Root and

stem pressures and exudation phenomena, Processes concerned in water absorption, Factors affecting the absorption of water, The absorption of solutes, Absorption deficits and their effects on plants. The great volume of work done on these subjects is described in clear and simple terms supported, where necessary, by admirable diagrams. The practical significance of the findings are constantly borne in mind, as for example in sections devoted to moisture control in greenhouse practice and to problems associated with irrigation. The bibliography covers 36 pages, and author and subject indexes are also provided.

This book can safely be recommended to the general horticulturist and agronomist as well as to students of soil science and botany. G.K.A.

# 1165. MIČURIN, I. V.

## *Selected works.*

Foreign Languages Publishing House, Moscow, 1949, pp. 496, 200 photographs, 7 coloured plates and portrait of the author, 15s.

The theories of Ivan Vladimirovich Mičurin, the distinguished Russian fruit breeder, have been used so often in recent years by the advocates of the new Soviet genetics that there is considerable curiosity to examine dispassionately the foundation of observation and experiment upon which a superstructure of theory has been erected sufficiently convincing to have seduced official Soviet scientific opinion from the paths of orthodox genetics.

Mičurin's writings have already acquired in Russia the prestige and authority of classics. P. N. Yakovlev, in his preface to this work, refers to Mičurin's teachings as "the only progressive biological science in the world" and concludes in similar strain. The extravagant language which his followers have chosen to honour Mičurin's memory may easily do a great disservice to his reputation and by laying a spurious emphasis upon his so-called teachings, divert attention from his great practical achievements as a fruit breeder.

Comparison is inevitable between Mičurin and Luther Burbank, the famous American plant breeder. Both were born during the middle years of the nineteenth century in comparatively humble circumstances. Both were inspired to establish small nurseries where they collected plants and practised the art of breeding on a progressively expanding scale. Even if we concede that they had great opportunities in the vast, undeveloped, continental regions that they served, undoubtedly both had a flair for the creation and selection of new fruits that amounted to genius and showed great persistence in the face of difficulties. It was to have been expected that such men, whose outlook approached more nearly that of creative artists than of formal scientists, and whose minds lacked the severe discipline of prolonged scientific training, should have been fertile in original ideas. Their ideas should be given most serious and earnest attention, but they cannot be accepted as established scientific facts. They can, at best, be regarded as the raw material of the experimental biologist and subjected to the rigid tests of proof.

By no means the least interesting part of this book is Mičurin's own account of his early struggles in

pre-revolution days to establish and maintain his small nursery. At the time of the revolution he had completed something like forty years' work in the acclimatization and improvement of fruit varieties, but had received scant recognition. Later, he had little cause to complain on that score. He was awarded the highest decorations of the Soviet, the city of Kozlov was renamed Mičurinsk, and his nursery became the centre of an extensive association of genetical, plant breeding and agricultural institutes. It is scarcely surprising that he devotes a number of articles to adulation of the regime. Alas, his theories, which he does not seem from his writings to have advocated with any particular fervour, have become in the hands of his followers an instrument for the suppression of Mendelian genetics in Russia. This volume consists largely of articles written by Mičurin for Russian periodicals between 1905 and 1935 varying greatly in length and content, often covering the same ground. The translation has been competently done and the English is, on the whole, lucid and readable. Considerable space is occupied by descriptions, usually well illustrated, of the new fruit varieties raised by the author.

It is not easy to put into a few words the essentials of "Mičurin's teaching". In these articles no attempt has been made to give it a systematic or regular form, and one repeatedly comes across the same ideas in slightly different guise. His attitude to conventional genetics is unequivocally contemptuous and he comments more than once on the impossibility of fitting what he calls "Mendel's pea laws" to inheritance in fruit trees. Indeed, Mičurin appears to deny entirely the immutability of the genes in character expression and their unchanged progression from generation to generation which is the foundation of orthodox genetics. He claims to have established that the characters of seedlings are quite plastic and capable of being changed by the agency of man during their early years. The idea that the characters of a young fruit tree seedling can be permanently changed by grafting upon it a piece of a mature variety possessing different qualities and called a "mentor", is perhaps Mičurin's most distinctive contribution to pomological thought, but one has only to glance through this book to realize how fertile he was in new and revolutionary ideas. Fundamental to all of them is his belief that young seedlings are not genetically stable.

Figures are used very sparingly, and the most startling statements are unsupported by exact data. Mičurin's exposition of his theory of "mentors" occupies only sixteen pages and in many places is disappointingly vague. Yet, to one engaged in a similar field of work, the book is both stimulating and challenging. One may ignore the author's rather petulant repudiation of formal genetics as important only in its consequences. Fruit trees are not favourable material on which to study the operation of the Mendelian laws, and what is found baffling by scientists steeped in the Western biological tradition is hardly likely to have been self-evident to Mičurin with little scientific training and a practical man's impatience.

It is remarkable that how few of Mičurin's assertions it is possible to return an uncompromising negative. While his "mentor" theory still lacks scientific proof, it also still awaits definite disproof, and though we may suspect that in many of his theories he was probably



mistaken, we have no direct experimental evidence on which to base such a conclusion. That he was an acute observer no one could doubt who gives reasonable attention to his writings, and if his ideas fail to carry conviction, they are stimulating and provocative. The fates have treated him unkindly. H.M.T.

1166. ROUNCE, N. V., AND OTHERS.

*The agriculture of the cultivation steppe of the Lake, Western and Central Provinces [Tanganyika].*

Published for the Department of Agriculture, Tanganyika, by Longmans, Cape Town and Lond., 1949, pp. 105, illus.

This small book, in which an earlier work is brought up to date, is primarily of interest to persons concerned with peasant agriculture in the comparatively dry, grassland regions of central Africa. The only crops mentioned that may concern the horticulturist are cassava and sweet potatoes, for which local cultivation practices are described. With cassava, trials are quoted which showed yield increases of up to 80% from the use of 9 tons cattle shed manure per acre, of over 30% following green manuring both in the year of digging in and the first residual year, and reductions averaging 47% from the practice of picking young leaves each month for spinach. Innumerable varieties of cassava are to be found in the area, and it is noted that some are highly tolerant of mosaic disease. In a brief note on sweet potatoes it is again noted that many varieties are grown, the best yielders being generally of the fine-leaved birds-foot type; one introduced variety, Caroline Lea, has yielded about two-thirds as much as a popular local variety known as Madebe. The crop is unusually free from serious diseases.

1167. SOUTHWICK, L.

*Dwarf fruit trees.*

Macmillan, N. York, 1948, pp. 126, illus., 21s.

This is primarily a book for the amateur living in the temperate fruit-growing areas of the U.S.A., by an extremely able professional. Its appeal will be to the man with a house and bit of land on which he hopes to raise fruit for the family. Since his trees will be few, all the more reason why they should be of the best quality, small for ease of management, and early croppers. The author bases his advice on full knowledge of the English work on standardization of rootstocks and on an appreciation of pollination problems. The general advice given on choice of tree, planting, pruning and cultural treatments, etc., should be extremely valuable in all temperate lands where fruit gardening is appreciated.

1168. UNESCO.

*List of scientific papers published in the Middle-East received by the Science Co-operation Office Middle East between 15 March and 1 October 1949.*

8, Sh. El Salamlik, Garden City, Cairo, 1949, pp. 22.

Periodicals cover those received from Anglo-Egyptian Sudan, Cyprus, Egypt, Iran, Iraq, Lebanon, Palestine, Syria and Turkey; more than a few concern agriculture.

Of the non-periodical, mainly short, papers of horticultural interest the majority, in Arabic, are from Egypt.

1169. BRITISH WEST INDIES.

*Fourteenth Annual Report British West Indies Central Sugar Cane Breeding Station, Barbados, 1947*, pp. 45 [received 1950].

In addition to the usual B Series a B.s. Series has been introduced with the object of selecting early maturing or short season types specially suited to British Guiana and to provide varieties for spring planting in Trinidad and Jamaica. From the B.47' Series 366 selections have been made, and it is noted that 8 crosses were responsible for a high percentage of these, B.37161 × B.4098 being particularly outstanding. Among earlier selections 3 varieties of the B.43' Series, B.4362, B.43337 and B.43391 have shown considerable promise, and 2 others, B.43229 and B.43235, are considered worthy of mention. Field trials with plants, 1st and 2nd ratoons of B.41' and earlier selections showed B.41211 yielding well in low and intermediate rainfall areas, and B.41227, particularly as ratoons, in high rainfall areas; both compared favourably with B.37161, which comprised 83.83% of the 1947 crop in Barbados, and with B.4098. Progress with selections in other colonies is also noted. In Trinidad trial plots reaped in 1947 showed B.34104, B.3337, B.37161 and B.37172 generally leading, but with their order varying widely from trial to trial. In Antigua B.4098 reaped for the first time in formal trials in 1946 and again in 1947 beat all other varieties in most trials. In different parts of St. Kitts no variety proved outstanding in 1947 with the possible exception of B.37161; this variety, contrary to experience in Barbados, appears to have a sugar content as high as, or higher than, B.34104, B.3439, B.4098 and B.40105. In Jamaica 71 varieties were tested during the 1947 crop season, the most outstanding being B.3439, B.34104, B.37161, B.37172 and B.4098. In British Guiana only B.34104 has been thoroughly tested but it has done exceptionally well, though with poorer juice quality than was expected. In mosaic disease investigations only 2 varieties of the B.44' Series showed symptoms of the disease after artificial inoculation. A laboratory trial suggests that temperature at the time of inoculation has a bearing on the take obtained.

1170. BRITISH WEST INDIES.

*Fifteenth Annual Report British West Indies Central Sugar Cane Breeding Station, Barbados, 1948*, pp. 38 [received 1950].

In the B.49' Series, representing selections bred in 1946, canes considered too thin for commercial purposes were, for the first time, discarded at the time of planting the First Year Seedling Trial. In the B.44' Series, Third Year Seedling Trials were reaped, but none of the seedlings proved better than the standard varieties B.37161 and B.4098; B.44341 was perhaps the best of them. First ratoon trials with seedlings of the B.43' Series were seriously affected by drought, two trials being abandoned. Four trials were, however, completed, though under abnormal conditions. In a low rainfall area 8 of the varieties exceeded the standards B.37161 and B.4098, while in an area of intermediate

rainfall 10 proved to be better; B.43127 proved outstanding in both these centres though its plant cane results were not so good. Of the varieties that yielded well as plants B.43337 also ratooned well under these dry conditions, but the quality of its juice was not particularly good; B.43391 gave similar yields to B.37161, but its juice, too, was only of fair quality. In two high rainfall area trials, 3 and 2 seedlings respectively exceeded the standard varieties in yields but only one of these, B.43391, was outstanding in both trials, as it had been in the plant cane trials. Amongst older selections B.41211 has again proved its ability to yield well under all ecological conditions in Barbados, and B.41227 has also given some excellent yields, as has B.4098. B.37161 constituted 90% of the 1948 crop in Barbados, 84-69% in St. Kitts and 55-66% in Antigua. In British Guiana B.34104, Co. 421 and D.14/34 have expanded to nearly 60% of the total acreage, mainly at the expense of P.O.J.2878. B.34104 is the dominant variety in both Trinidad and Jamaica, but doubts are expressed as to its future owing to susceptibility to mosaic. In Jamaica comparative trials are to be made between this variety and B.41227, which appears to be highly resistant to mosaic and in a single trial outyielded B.34104.

1171. BUREAU OF SUGAR EXPERIMENT STATIONS, QUEENSLAND.  
*49th Annual Report of the Bureau of Sugar Experiment Stations, Queensland, 1949, 1949, pp. 53.*

The director's report, giving a review of the sugar-cane industry in Queensland, analysed production figures, and a summary of the work of the Bureau is followed by reports from the Divisions of Soils and Agriculture, Entomology and Pathology and Mill Technology. Work of the Experiment Stations covers a wide field; the following selected items will give an indication of its extent. Evidence from 39 trials confirmed the theory that there is no advantage in the application of nitrogen to cane at planting time. The response of first ratoon crops on acid soil to the application of lime was even more favourable than that of the plant crops recorded last year; there are indications that the crop response is more closely correlated with the Ca and Mg content of the soil than with the actual pH. The application of molasses to sugar soils markedly increased the number and stability of aggregates present and improved crumb structure. Variety trials and breeding work were continued. The summer cover crops, Poona pea, giant cowpea, velvet bean, Reeves' selection and Cristando pea constitute a group from which may be selected a type suitable for any condition, including dry and over-wet districts. The efficacy of Gammexane as a control for the grey-back cane beetle grub (*Dermolepida albohirtum*) has been conclusively shown; an application of 150 lb. 10% dust per acre has sufficient residual effect to ensure freedom from damage over the plant and 2 ratoon crops. Wireworms have been well controlled by the use of 20 lb. 10% benzene hexachloride dust per acre mixed with 3 cwt. of the appropriate fertilizer. A ratoon stunting observed in Q28 was shown to be caused by a transmissible disease, the causal agent of which has not yet been isolated. A comprehensive programme of research into the causes and control of this disease is now being carried out.

1172. CANADA, DEPARTMENT OF AGRICULTURE.  
*Annual Report of the Forest Insect Survey, Forest Insect Investigation, Division of Entomology Science Service, 1947, 102 pp.*

In this account of the insects found in 1947 on forest or shade trees in Canada it may be noted that a few of the insects mentioned were found also on horticultural plants, viz.: The white-marked tussock moth (*Hemerocampa leucostigma* A. & S.) on fruits and vegetables; the mountain ash sawfly (*Pristiphora geniculata* Htg.) causing serious injury to ornamentals; walnut caterpillar (*Datana integerrima* G. & R.) on walnut, butternut and hickory; ash blister beetle (*Lytta sphaericollis* Say) on lilac; leaf chafers (*Dichelonyx* spp.) on currant; tent caterpillars (*Malacosoma* spp.) on apple, currant and gooseberry; spotted tussock moth (*Halisidota maculata* Harr.) on apple and plum; and pepper and salt moth (*Amphidasis cognataria* Gn.) on apple, plum and caragana.

1173. CEYLON RUBBER RESEARCH SCHEME.  
*Report of the work of the Rubber Research Board, Ceylon, in 1948, 1949, pp. 46+ appendixes.*

*Chemical:* Studies on the yellow colouring matter in the latex of certain clones have not yielded any means of decolorization. Tests were made with fungicides in crepe rubber, but none conferred the same mould resistance as paranitrophenol without its undesirable discolouring effect. *Botanical and Mycological* (C. A. de Silva): The incidence of the following diseases is noted: *Oidium*, *Phytophthora*, *Fomes* and brown bast. With the first named it is suggested that in dry districts and high elevations the adverse effects are cumulative owing to poor refoliation following repeated attacks, and the planting of rubber in such areas should be discontinued. Progress reports are given on trials with new clones, seedlings, rootstocks, tapping intensity and the taking of bud grafts from the main stem and branches of parent plants. Girth measurements in the last named trial show no differences between the growth of the bud grafts. *Soils* (C. A. de Silva): Progress reports are given on several manurial trials, among which may be noted: (1) On rubber 31-38 years old NPK significantly increased yields over all other treatments; N also showed a significant response in 1948. (2) With young budded rubber there was a fair response to manuring over 5 years but no response in 1948, indicating that the main effect of manuring has been to bring the trees into earlier tapping. (3) A phosphate experiment on young rubber at Hedigalla showed increased girth from all three levels of P. *London Advisory Committee for Rubber Research (Ceylon and Malaya)*: The report of this committee includes a summary of research on the processing of rubber. Among the investigations reported is one designed to determine the properties of rubber and preserved latex from 12 well-known Malayan clones. It is too early to say whether minor differences in properties so far observed are characteristic.

1174. CHESHUNT.  
*Thirty-fourth Annual Report of the Cheshunt Experimental and Research Station 1948, 1949, pp. 90.*

*Tomatoes:* Cardboard boxes treated with cuprinol were used successfully for growing tomatoes. The



boxes were in a good state of preservation at the end of the season, and no injury was caused to the plants. Applications of top-dressing fertilizers in solid and solution form were equally successful. In variety trials the English variety Downes Seedling and a Dutch variety, Bruinsma, headed the list with yields of 61 tons per acre. The former is of better quality than the latter. *Lettuce*: Cheshunt 5b matured 8 days earlier than Cheshunt Early Giant. *Mushrooms*: Mushroom beds steam sterilized after the first crop and used again, produced a very poor second crop. *Plant diseases*: In pot experiments with tomatoes no relationship could be found between manurial treatment with N, P and K and infection by *Didymella lycopersici*. Excess of magnesium, boron and manganese did not appear to influence infection. The spread of mosaic virus in tomato plants was reduced by 50% by spraying the plants with a solution of 1% tannic acid on 2 consecutive days. Plants of *Solanum capsicastrum*, infected with mosaic virus, were cured by exposure to a temperature of 105° F. for 12 hours a day on 4 consecutive days, when the concentration of virus within the plants was low. *Pests*: An account of detailed observations on the life history, habits, and control of the tomato leaf miner, *Liriomyza solani*, is given. Trials of some of the new insecticides on glasshouse pests are reported. *Chemical problems*: The effects of calcium, boron and magnesium deficiencies on *Asparagus plumosus nanus*, 3 varieties of chrysanthemum, *Solanum capsicastrum* and tomato were investigated. A disorder of *S. capsicastrum*, resulting in yellowing and loss of leaves, is shown to be due to magnesium deficiency. It can be corrected by the addition of Epsom salts to the fertilizers used.

1175. COLONIAL INSECTICIDES COMMITTEE.  
Second Annual Report of the Colonial  
Insecticides Committee, 1948-1949.  
*Colonial Research 1948-49*, H.M. Station-  
ery Office, Lond., Cmd 7739, pp. 101-29.

Of special interest with regard to plantation crop protection in this report are notes on the control of froghoppers of sugar-cane in Trinidad with DDT and BHC dusts applied from a Bell helicopter (pp. 111-12, 128-9), and the chemical destruction of trees and the development of prophylactic methods for the protection of cacao in swollen shoot areas (p. 112).

1176. COLONIAL PRODUCTS RESEARCH COUNCIL.  
Sixth Annual Report of the Colonial Pro-  
ducts Research Council 1948-49.  
*Colonial Research 1948-49*, H.M. Station-  
ery Office, Lond., Cmd 7739, 1949, pp.  
33-54.

The various research activities of the council are noted, and the lines along which they are developing very briefly reported. These activities include studies of the content, quality and preparation of vegetable oils, in particular conophor, rubber seed, niger seed, safflower and sunflower seed, tobacco seed, castor and stillingia oils; chemical studies of plants of possible medicinal and insecticidal value; the attempted preparation of pure pyrethrins to serve as standards for the possible ultra-violet and infra-red spectroscopic assay of pyrethrum flowers; and a study of the microflora involved in cocoa bean fermentation, and

the changes that take place in the pigments during the process.

1177. C.S.I.R., AUSTRALIA.

*Twenty-second Annual Report, Council  
for Scientific and Industrial Research,  
Australia, for the year ending 30 June  
1948*, 1948, pp. 141, 8s. [received 1949].

The following sections of this comprehensive report are of particular interest to horticulturists: II. *Plants*.—(3) *Weed control*: Specific control of the following weeds by hormones, etc., was investigated: *Lepidium draba*, *Chondrilla juncea*, *Cyperus rotundus* (nutgrass), *Xanthium spinosum*, *Bassia burchii*, *Rubus fruticosus* (blackberry), *Loranthus* spp. (mistletoe), *Salvia reflexa*, and certain trees. Pre-emergence tests with phenoxy-acetic acid compounds proved toxic to all dicotyledons tested. (4) *Introductions*: Among them vegetables, oil seeds including castor beans, and yam beans, *Pachyrrhizus* spp. (6) *Fruit investigations*: At Stanthorpe, Qd, 2 apple rootstock trials are in their tenth year. In the first, using Granny Smith and Jonathan as scions, the largest trees were those on Malling XII and XVI and Pomme de Neige seedlings, the smallest on Northern Spy seedlings and Malling I; heaviest cropping to the 9th year was on Spy; in the 10th year Jonathan cropped most heavily on XII, but Granny Smith still led on Spy. In the second, with Jonathan on Malling XII, S4 and Ivory's Double Vigor, trees on XII have cropped most heavily; in a superimposed pruning trial light pruning has produced the largest trees and about twice the crop as compared with heavy pruning. In a nursery trial with pear rootstocks William's Bon Chrétien on Malling D 3 has cropped most heavily, with other stocks in the order *Pyrus calleryana*, C7, D4 and B1 selections; largest trees are those on *P. calleryana*. (7) *Drug plants*: Investigations are reported on opium poppy, on *Duboisia* spp. and on *Eucalyptus macrorrhyncha*, the leaf of which yields rutin. (8) *Tobacco*: Investigations are in progress on varieties, fertilizer and irrigation requirements including physiological studies, and on the yellow dwarf and big bud viruses. (9) *Vegetables* and (10) *Virus investigations*: Disease investigations are being carried out on potatoes, tomatoes, peas and beans. III. *Entomological*.—(9) *Insect vectors of plant viruses*: Tobacco and potatoes. (10) *Vegetable pests*: Cabbage moth and cabbage butterfly and cabbage aphid control experiments. VII. *Irrigation*, Merbein, Victoria.—(4) *Horticulture*: Manurial trials are in progress. The tendency of non-setting of grapes of the Gordo Blanco vine (Muscat of Alexandria) has been further examined. Investigations on iron chlorosis in vines and fruit trees are reported. (5) *Plant work*: Studies are mentioned briefly on pruning in relation to fruit bud formation in sultanas, small-scale weed control trials, vitamin C in tomatoes, shoot growth behaviour in citrus, chloride content of citrus leaves, effects of Mn and Zn sprays on citrus, swabbing trials with minor elements on vines, and the hormone physiology of vines. (6) *Pests and diseases*: Of grapes. (7) *Fruit processing*: Of sultanas. (8) *Vegetables*: Variety trials with Fusarium wilt resistant tomato hybrids. VII. *Irrigation*, Griffith, N.S.W.—Brief progress reports are given on (2) complex field experiment with oranges, (5) depth and spacing of tile

drains in orchards, (7) salt damage in orchards, (8) vegetable investigations including minor elements, (9) plant physiology with special reference to tomatoes, and (10) frost investigations involving the use of fans.

IX. *Food preservation*.—(7) *Fresh fruit and vegetables*: Progress is reported on investigations into the nature of the organization of the plant cell and its respiratory behaviour with special reference to apples. Work on skin coatings for apples has ceased; at this stage their use cannot be recommended. Studies are also reported on orchard variability in relation to the storage of apples, maturity and storage studies with apples, cool storage of peaches, nectarines, plums and pears, and the maturity and ripening of papaws. (8) *Dehydrated foods*: Work on both vegetables and fruit is reported. (9) *Canning*: Variety tests are mentioned on tomatoes, beetroot, rock melons, and peaches and maturity studies on apricots. XXII. *Other investigations*.—(9) *Rubber (guayule) investigations*: Satisfactory progress has been made over 5 years in studies on growth and rubber content.

1178. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION,\* AUSTRALIA. *First Annual Report for the year ending 30th June 1949*, Melbourne, 1949, (Mimeo) pages numbered sectionally.

Certain sections are of great interest to horticulturists. III. *Plants*.—(11) *Weeds*: Investigations are reported on the successful use of hormone weedkillers against annual and less successful use against perennial weeds, on the use of petroleum oils on monocotyledons, on new weedkillers, on soil fumigants and on the specification of 2,4-D as a weedkiller. (12) *Introductions*—among them camphor basil. (16) *Fruit investigation*: New woolly aphid-resistant apple stocks from England have now been budded to Jonathan at Stanthorpe, Qd. Studies on soil sickness, on the effect of nitrogenous manuring on apple storage and on apricot gummosis, due to *Cytosporina* sp., severe in Tasmanian and S. Australian orchards, are reported. (17) *Drug plants*—including opium poppy, *Duboisia* spp. and *Eucalyptus macrorrhynca*. (18) *Tobacco trials* at the Queensland Tobacco Exp. Stat. Clare and elsewhere concern irrigation, diseases, chemistry and the physiological aspects of water needs and suckering and on nematode control. (19) *Plant diseases* included potato and tomato viruses, pea and bean resistance to various diseases. (23) *Guayule*: Seven years' field work on growth conditions is complete; much laboratory work is still necessary.

IV. *Irrigation*.—(2) *Merbein, Victoria*: Trials reported concern, *inter alia*, irrigation of light soils for horticultural plants, reaction of horticultural plants to pruning and the processing and preservation of horticultural products. Among plants much to the fore are vines, tomatoes, citrus. (3) *Griffith, N.S.W.*—Physiological and chemical studies of plants under irrigation when subjected to various manurial and management methods. Frost prevention trials in 1949 showed that a fan of 7 h.p. capacity could raise the temperature 2° F. over an area of 1 acre in citrus and 2 acres in almonds. In vegetable nutrition investigations work on the degree of "fixation" and rate of accumulation of phosphatic fertilizer continues and the

\* This has taken the place of the C.S.I.R.

effects of spring fallowing are being watched. Tests are reported on the application of anhydrous ammonia as a fertilizer in irrigation water.

XI. *Food*. Fruit and vegetable transport investigations include studies of evaporation in fruit and vegetables. Storage trials concern metabolites in apples, apple growth, respiration in plant tissues, viz. apples and carrots; the possible determination of maturity by observation of dates of blossoming; storage of peaches and nectarines, pears and lemons; wastage in citrus fruits. Processing concerns canning, juice production, dehydration of fruit particularly raisin grapes, wine making.

XXIX. *Information and Library Services*.—Steps are described whereby Commonwealth Agricultural Bureau publications have been made more readily available to workers in Australia.

1179. HORTICULTURAL EDUCATION ASSOCIATION. *Scientific Horticulture*, Volume 8, 1939-47, Dec. 1949, pp. 268.

This consists of *Occasional Publications on Scientific Horticulture*, Nos. 1-5, issued by the H.E.A. between 1939 and 1947. The articles are mostly reprinted in their original form with some verbal amendments. The article on Horticultural Films has, however, been revised up to the end of 1948. [The separate publications were previously abstracted in *H.A.*, Vol. 13, various, Vol. 14: 1439 and Vol. 17: 1847.]

1180. LAUSANNE.

Rapport d'activité 1948 des stations fédérales d'essais viticoles, arboricoles et de chimie agricole, à Lausanne et à Pully. (*Annual Report of the Lausanne Horticultural Research Station 1948.*)

*Landw. Jb. Schweiz*, 1949, 63: 767-904.

*Physiology and mycology*: In the control of vine mildew, *Plasmopara viticola*, bordeaux mixture again proved superior to other fungicides tested, but a schedule of two applications of 0.4% Copper Sandoz followed by five applications of bordeaux mixture were as effective as seven applications of bordeaux and caused less injury to the young shoots. None of the chemicals was capable of checking the development of the fungus if treatment was postponed until the first symptoms appeared. Bordeaux mixture was shown to have the greatest residual effect.—Wettable sulphur was as good as lime-sulphur for the control of apple scab but inferior to lime-sulphur plus copper. Wettable sulphur of the finest particle size yielding the most stable suspension was least injurious. The addition of lead arsenate to wettable sulphur for the combined treatment of scab and codling moth may be considered safe.—The testing of fungicides against apple mildew was continued.—For the control of leaf curl of peach, *Taphrina deformans*, two applications of 1.2% Copper Sandoz was as effective as 2% bordeaux mixture; but there is as yet no cure for peach mildew or pear rust.—Downy mildew of lettuce, *Bremia lactucae*, occurred on cardoon, *Cynara cardunculus*. Preventive treatment with a copper salt is recommended.—Onion smut was successfully combated by applying  $\frac{1}{2}$  litre of 0.3% formalin per 1 m. of row just before sowing.—Steam sterilization gave better control of *Pythium* and *Rhizoctonia* than soil treatment with fungicides.—With some varieties of vine, fruit set and the percentage of



ripe berries were considerably increased by the application of hormone preparations some time before flowering.—The treatment of pea seed with the sodium salt of  $\alpha$ -naphthaethylglycinate inhibited or stimulated germination and retarded or accelerated root growth according to concentration.—Continued experiments on the control of fruit drop by hormones showed (1) that quinces are as amenable to the treatment as other fruit varieties and (2) that trees, especially plums, treated in 1947, blossomed later in 1948 than the controls, but fruit set and ripening was not affected.—In a study with cress seedlings on the persistence of phenoxyacetic acid substitutes in the soil it was found that under dry conditions the toxicity of 2,4-D did not diminish perceptibly during a period of over 9 months. After a precipitation of 30 mm. during a period of 3 weeks the inhibitory action on germination was transformed into stimulation, which disappeared after a precipitation of 40 mm. A precipitation of 60 mm. in 6 weeks was needed for the inhibitory effect on root growth to disappear. 2,4,5-trichlorophenoxyacetic acid proved less and 2-methyl-4 chlorophenoxyacetic acid more toxic than 2,4-D.—*Entomology*: In preliminary trials parathion gave promising results against cochylis and red spider of vine and against sawfly of plum and pear, whereas DDT proved superior in the control of apple blossom weevil.—Data show that parathion will solve the red spider and woolly aphid problem in apple orchards created by the application of DDT for codling moth control.—Soil injections of 1% hexabenzene-chloride solution at the rate of 25 litres per standard tree gave the best control of white grubs in fruit plantings.—*Viticulture*: Vine topping—i.e. stopping shoot growth when flowering begins—did not yield a significant increase over the controls and it is suggested that this practice may be discontinued in young vineyards.—From 10 years' trials it is concluded that hormone treatment of the cut surface of the rootstock immediately before grafting has a beneficial effect on the percentage "take".—*Pomology*: The observations made on trial plantings of fruit trees at altitudes of 1,000-1,200 m. are discussed and hardy varieties of apple, plum and cherry are recommended for this purpose.—*Fungicides*: Extensive experiments were carried out on the deposit of copper sprays on vine, potato and apple leaves, and the apparatus used is described.—*Soils and fertilizers*: This section reports *inter alia* manurial trials with vines and fruit trees.—*Physiological chemistry*: The subjects discussed again include the storage of table grapes and the gas storage of pears.

# 1181. LAWES AGRICULTURAL TRUST [ROTHAMSTED].

*Report of Rothamsted Experimental Station for 1948, 1949, pp. 151, 5s.*

The work of the various departments of the Station is briefly described. Investigations of horticultural interest include a study of the response of plants, including lettuce and tomato, to molybdenum under various nutrient conditions; a survey of the agricultural practices followed in growing main crop potatoes; a study of the spread of lettuce mosaic; a determination of the possible harmful effects of various herbicides and insecticides on honey bees; and cultural and manurial field experiments with potatoes.

# 1182. THE MACAULAY INSTITUTE FOR SOIL RESEARCH.

*Annual Report Macaulay Institute for Soil Research, 1948-9, pp. 34.*

After an Introduction the report describes the work that is being carried out at the Institute in pedology, spectrochemistry, soil organic matter, plant physiology, soil fertility—chemistry and experimentation, collaborative work, and lists publications.

# 1183. MALTA.

*Report on the working of the Department of Agriculture Malta during October 1938 to September 1946 and the agricultural year 1946-47, Malta, 1949, pp. 145.*

This soberly written account of the measures adopted by the Department of Agriculture to deal with the formidable emergencies which confronted a small island thrust into the forefront of a world war is appropriate to the tremendous efforts necessary and the results achieved. Its chief interest to the horticulturist lies in the account on pp. 18-20 and in an appendix, pp. 136-9, of the initiation by the government of a vegetable and flower seed production industry. At the end of 1946 it was decided that the experimental stage had been satisfactorily completed and that the industry must henceforth depend on private enterprise. Neither the early nor subsequent difficulties are minimized, but definite progress was made both in interesting Maltese producers and English seed importers.

# 1184. MASSACHUSETTS.

*Annual Report of Massachusetts Agricultural Experiment Station for year ending June 1949, Amherst, pp. 86, being Bull. 453.*

A great many experiments covering a wide field of horticulture are briefly reported. They include a comparison of the effects of spring and autumn fertilizing of tobacco seed-beds; tests of spray materials for control of late blight of potatoes; studies of tobacco frencing; control of cranberry bog weeds; studies of winter killing of cranberry vines; investigations on control of plum curculio, onion thrips, squash vine borer, celery plant bug, cabbage maggot, and grape cane girdler; studies in the use of selenium for pest control in flower crops; vegetable breeding work; experiments in chemical thinning of fruit blossom; studies on the nature of winter hardiness in the raspberry; and trials of herbicides for use in fruit plantations.

# 1185. NIGERIA.

*Annual Report Nigeria Agricultural Department for 1948, Lagos or Crown Agents for the Colonies, Millbank, Lond., 1949, pp. 75, 9d.*

It is somewhat difficult to gain a clear picture of progress with regard to any one crop from this report, which actually consists of 8 separate reports, one for each of three provinces and the rest specialist. Some points of interest are noted below: *Oil palms*: New experiments started at the research station are: (1) A nursery experiment with various combinations of shading and watering. (2) An experiment to find ways of protecting newly transplanted seedlings against pests; painting the base of the seedlings with tar has

been found to attract rather than deter pests. (3) A large-scale manurial trial using selfed *dura* seedlings. (4) Trials with 9 cover crops. Other work included: (5) The establishment of an NPK manurial experiment on 20-year-old palms. (6) The selection of 24 palms to produce seed for planting in drier areas. (7) Investigations into the weight of samples needed to give accurate estimates in fruit and bunch analysis showed that samples could be reduced from 4 lb. to 1 kg. without detriment. *Cacao*: (1) Multiplication of the local selection T 38 continued both by budding and by cuttings. (2) A survey of the cacao areas in the Cameroons was completed. (3) A spacing trial planted in 1942 with spacings ranging from 5 × 5 ft. to 15 × 15 ft. has, as expected, shown the highest yields from the closest spacing in the early years; less expected was the discovery that a close spacing, 6 × 7½ ft., gave the greatest yield per tree. (4) Collection of strains of the swollen shoot virus continued. *Citrus*: (1) Yield records from a grapefruit rootstock trial planted at Moor Plantation in 1932 were analysed up to date. Sour orange stocks have given the highest yields followed by acid lime, grapefruit and sweet orange; shaddock and rough lemon were failures. (2) In a corresponding trials with sweet oranges heaviest yields in most years have come from trees on sour orange, but in 1948 those on tangerine proved most productive; complete figures, however, are not yet available. (3) The average annual yields from a rootstock trial at Ilorin in the Northern Province are also given; sour orange and sweet orange lead by a substantial margin, the other stocks in order being acid lime, shaddock, grapefruit and rough lemon; unfortunately the scion variety is not mentioned. *Kola*: (1) Two species are grown, *Cola nitida* and *C. acuminata*; a 2-acre plot of the latter at Moor Plantation, which, for reasons unknown, failed to produce fruit for years, produced a small number of fruits in 1948. (2) Propagation by stem cuttings has been tried for both species, but so far with only about 19% success. *Dates*: It has been established that the production of offshoots for clonal reproduction from young palms is possible only if they receive an adequate water supply, but that water-logging will not be tolerated. *Tetracarpidium*: In view of the potential value of this plant as a source of vegetable oil, multiplication by vegetative propagation was tried; terminal cuttings of green shoots, thin and thick woody cuttings and root cuttings were used but without success.

## 1186. PENNSYLVANIA.

*Sixty-second Annual Report of the Pennsylvania Agricultural Experiment Station for the year ending 30th June 1949*, being Bull. 515 (Science for the Farmer), 1949, pp. 66.

The following items of interest have been selected from this report. *Mushroom growing*: Soils of high magnesium content, when used for casing, delay production of the crop and may reduce the yield by half. Applications of zinc-bisdiethiocarbamate (Parzate or Dithane Z 78), at 1 lb. per 100 gal. water, successfully controlled *Mycogone* "bubble", *Verticillium* "spot" and *Dactylium* "mildew" of mushrooms. They should be applied at 1 pint per 10 sq. ft. when the beds are first watered after casing, and again after the first and

second breaks. *Orcharding*: Defoliation of peach trees by bacterial leaf spot, *Bacterium pruni*, was found to be inversely related to vigour. The potassium content of the leaves was highest in the most vigorous trees, and in some cases applications of potash have eliminated or reduced the incidence of leaf spot. Manure, grape stems or pomace applied at 6 tons per acre every third year gave a highly significant increase in grape production, but annual applications of vine trimmings to the soil did not have any effect on fruit production or vine growth. DDT, parathion and DDD all gave satisfactory control of the grape berry moth. *Tobacco*: Complete control of wildfire in seedbeds was obtained by 3 sprays of 4-2-50 bordeaux mixture at 10- to 14-day intervals. The first application was made before the seedlings emerged. Very promising strains of wildfire-resistant cigar leaf tobacco have been obtained. *Vegetables*: Results of variety trials with sweet corn, squash and pepper are reported. The most effective control for late blight and anthracnose of tomatoes was obtained by 3 sprays of Zerlate followed by later sprays of fixed copper.

## 1187. QUEENSLAND.

*Annual Report of the Department of Agriculture and Stock, Queensland, for the year 1948-49*, Brisbane, 1949, pp. 99.

*Fruits and vegetables*: Pedigreed pineapple material is gradually becoming available for planting. The trend from dwarf Cavendish to semi-dwarf Mons Marie and tall Lady Finger varieties of banana continues. The perennial pea is showing promise as a crop for regenerating old banana land. The budwood scheme for citrus is to be reviewed in the light of a recently completed psorosis survey. Pedigreed seed of two papaw varieties, Bettina and Improved Petersen, will shortly be available. Dates introduced from the U.S.A. are coming into bearing and showing promise. Vegetable investigations are likely to expand as the Redlands Experiment Station develops. One of the main functions of the Maroochy Experiment Station will be to improve plant type in the commercial crops of the north coast. The Kamerunga Station, also of recent origin, will chiefly be concerned with tropical horticultural crops. Causes of wastage in pineapple known as water blister and black heart are being sought. *Sugar cane*: A report of the Bureau of Sugar Experiment Stations contains notes on varietal trials, herbicides, the work of various experiment stations and entomological and pathological progress. *Tobacco*: Varietal, fertilizer, and crop rotational trials are briefly noted, and spray and furrow irrigation methods of tobacco growing are compared.

## 1188. QUEENSLAND ACCLIMATISATION SOCIETY.

*The Eighty-third Report of the Queensland Acclimatisation Society for 1948-49*, Brisbane, 1949, pp. 12.

Observations of the growth of a split avocado seed disclosed the possibility, with the help of a growth substance, of raising sometimes as many as 4 plants from 1 split seed. Two pedigree papaws, Bettina and Improved Petersen, are fixed in type and can yield seed which permits the production of papaws identical in shape, size and quality.



## 1189. SASKATCHEWAN.

*Progress Report Swift Current Dominion Experimental Station, 1937-47*, 1949, pp. 116.

The work of this station is mainly agricultural. The 10 pages devoted to the results of horticultural research contain information on the planting and care of shelter belts, and lists of varieties of vegetables, ornamentals and fruits that have proved suitable for local conditions, together with brief recommendations for their culture.

## 1190. TANGANYIKA.

*Annual Report of the Tanganyika Department of Agriculture 1947, 1949*, pp. 150, Shs. 6.

Experimental work, pp. 23-31. The work of the Sisal and Coffee Experimental Stations, summarized here, is published separately in their respective annual reports. [That of the former has already been abstracted in *H.A.*, 19:3586.] *Potatoes*: Testing and multiplication of suitable blight-resistant varieties from Scotland is being carried out at Lushoto Farm, and seed of the best 3 varieties was expected to be available to planters by the end of 1948. *Tobacco*: Trials were continued with *Nicotiana rustica* at four points in the Southern Highlands Province under varying altitude and climatic conditions. Seed germination was satisfactory and good stands were obtained, but the yields of leaf and nicotine proved disappointing. These trials are not to be continued. *Onions*: Experiments at Moshi were mainly concerned with the effect on yield of rate and time of application of sulphate of ammonia combined with spacing distances. Similar results were obtained to those reported last year [see *H.A.*, 18:2331]. Efforts to produce onion seed locally in the Mbulu District were seriously hampered by onion thrips. In experiments on the control of this pest, DDT/oil emulsion (1:25) gave the most promising results. On DDT-treated plots the foliage was outstandingly better, and growth persisted about 3 weeks longer, than on other plots. *Cassava*: Twelve Amani varieties continued to show a greater resistance to mosaic and brown streak than the local variety. Amani 4026/20 appeared to be completely immune.

## 1191. TEA RESEARCH INSTITUTE OF CEYLON.

*Annual Report of the Tea Research Institute of Ceylon for 1948*, being *Bull.* 30, 1949, pp. 67.

The report again gives prominence to blister blight caused by *Exobasidium vexans*. Conditions were generally more favourable to the disease in the wet zone than in 1947, but the soundness of the recommendations on pruning times and methods was again demonstrated. The difficulty of protecting tea in plucking remains, however, and the only real solution would appear to be spraying, though this in turn raises many difficult problems. Studies on the fungus have been continued and an account of the work is shortly to be published in the *Tea Quarterly*. The report also covers work done on other diseases and pests, among the former being brown blight caused by *Colletotrichum camelliae*, which has followed blister blight as a secondary invasion. *Manurial trials*: In various trials applications of P and K have given rather confusing results;

the conclusions reached from 20 years' work are described in detail in *Special Monograph No. 1* [*H.A.*, 19:3476]. In this report reference is made to the responses of weeds as well as tea to P and K, and among the conclusions provisionally reached are: (1) P at rates up to 30 lb. per acre is effective on both tea and weeds, and for the weeds there is no difference in efficiency between mineral rock phosphate and super. (2) The effectiveness of super is not seriously affected by reversion to non-available forms even after 4 years. (3) The behaviour of P on Passara soils is anomalous; unlike St. Coombs soils the presence of K appears to be necessary to obtain a response to P from weeds. (4) Weeds in old tea have given no response to K, whereas on young tea there have been responses; this suggests that a reserve of K has been built up in the former from liberal manuring in the past. *Propagation and selection*: 154 clones are under trial. In vegetative propagation of cuttings poor results in some cases have been traced to over-watering and also to the use of unsuitable, heavy soil and to lack of drainage. A trial comparing red wood and green wood cuttings showed significantly better rooting from the latter, but the former rooted sufficiently well to justify their continued use, the use of a new hormone having no effect on the speed or percentage of rooting. Thirty clones were tested for variation in rooting; after 4 months the range of variation was from 22% to 84% with a mean of 51%. *Biochemistry*: Investigations on the volatile matter in tea indicate that the major part of the steam volatile matter measured in previous experiments is methyl alcohol derived from the breakdown of pectin during fermentation. The enzyme involved, tea pectase, has been studied and purified. Pectase activity in different component parts of the flush and also in a number of different clones is tabulated. *Manufacture*: Comparison of results obtained from epicyclic and from batten and pressure cap rolling have shown that the former will give as good results if the leaf is of good standard but not otherwise.

## 1192. TRINIDAD AND TOBAGO.

*Administration Report of Director of Agriculture, Trinidad and Tobago 1948*, 1950, pp. 28, 36c.

*Cacao*: Preliminary work, designed to devise a system of fermenting small lots of beans from single seedlings, indicates that the process takes place in two stages, one of which occurs at a low temperature and may even take place inside the pod, while the second phase is aerobic and develops temperatures of 50-55° C. Clonal propagation proceeded rapidly, about  $\frac{1}{2}$  million plants being produced in 1948; new rooting techniques are under investigation. Two strains of virus, both mild by comparison with "swollen shoot", are virtually restricted to the N.W. corner of the Island and it is proposed to establish a cacao-free belt around this area. Trials designed to revive old, senescent trees have so far produced no appreciable improvement. *Sugar-cane*: The variety B.34104 still predominated, accounting for 55% of the total acreage. In hilly areas contour cultivation was more widely adopted. Investigations on the control of frog hopper continued; both DDT and benzene hexachloride (BHC) produced practically complete and instantaneous knockdown, but the population began to increase again within a few hours

and was back to normal within 5 days. Thus the long-term residual effect of DDT noted in previous years was not confirmed; BHC, in contra-distinction to its ephemeral effect as an aerial dust showed lasting potency in soil. Dusting by helicopter proved uneconomical. Counts made on fields treated with anti-froghopper dusts did not indicate that borer parasites were more adversely affected than were the borers themselves. Increased borer populations in certain areas were found to be associated with the system of agriculture practised, the particular variety of cane and the particular species of *Diatraea*, long-cane planting of B.37161 being particularly associated with a very great increase in the density of *D. saccharalis*. *Citrus*:—Minor element trials have so far yielded uncertain results. In a field showing various leaf deficiency symptoms and some die-back, most of the trouble disappeared and the crop increased appreciably after a dressing of ammonium sulphate; Zn and Mn removed the leaf symptoms and Zn stopped die-back, but neither affected yield; Mg improved the appearance of the trees, but, added to N, caused a marked reduction in crop, and the improvement in appearance may be related to this lighter cropping. Investigations on the dying out of limes have continued. *Coconuts*: A block of seedlings from heavy-bearing parents has been started, in which selected Ceylon nuts are also included. Manurial trials were affected by drought, and no manure had any effect on reducing drought effects. On an east coast estate where drought had less effect, N proved beneficial, the response from poor bearers being much greater than from trees which normally bear good crops. *Yams and sweet potatoes*: Experiments with mechanization have continued with promising results; there was some indication that the size of yams produced can be controlled through the size of banks used, but this needs confirmation.

#### 1193. UNION OF SOUTH AFRICA.

##### Report of the Department of Agriculture for the year ended 31 August, 1949.

*Fmg S. Afr.*, 1949, 24: 493-604.

The report of the Secretary for Agriculture (pp. 493-520) contains information on the functions and services of the Department, and an economic review of the main agricultural products of the Union. The rest of the publication consists of the Divisional reports. Those of horticultural interest are abstracted separately.

#### 1194. ANDERSSSEN, F. G. (UNION OF S. AFRICA, DIVISION OF HORTICULTURE).

##### Extensive breeding and selecting programmes for horticultural crops.

*Fmg S. Afr.*, 1949, 24: 582-5.

The following research work is reported in this annual report of the Division of Horticulture, Department of Agriculture, S. Africa for 1948-49. *Citrus*: Work on nutritional problems, water relationships, cover cropping, rootstock influence, breeding and selection is briefly summarized. *Other sub-tropical fruits*: Fifty avocado varieties on West Indian, Guatemalan and Mexican stocks are under trial. Methods of vegetative propagation of mangoes are being studied, and a mango variety orchard has been planted to determine which varieties come true from seed. Extensive breeding and selection of papaws continues with the aim of developing a type that will produce a higher percentage of female

than male trees; promising material is already available. A high standard of uniformity in "Hortus Gold" papaw has been obtained by selection. *Vegetable production*: Variety trials and breeding projects continue. The results of onion planting trials indicate that, under Pretoria conditions, higher yields are obtained when seed is sown in February than when sown in March, although the percentage of split bulbs and "seed bolters" was much higher from the earlier sowing. Yield was also somewhat higher when the seed was sown directly *in situ* than when the seedlings were transplanted. Chemical analyses of tomatoes, chillies, beetroot and carrot varieties were carried out. Tomatoes harvested towards the end of February showed lower figures for sugar, dry weight and total soluble solids than those harvested at the beginning of February, thus indicating the important influence of climate and time of harvesting on the composition of the fruit. Some varieties of carrots differed in their sugar content by more than 100%, a fact that suggests the desirability of breeding for increased sugar content. The germination of beetroot seed was studied in an attempt to explain the inconsistency between results obtained from field sowings and those obtained by the official germination tests. This was found to be due to the reduction of nitrate nitrogen to nitrite nitrogen and then to ammonia by bacteria which are present on the outside of the seed. In soil this ammonia is absorbed and rendered harmless. The problem can be solved by sterilizing the outside of the seed before the germination test is made.

#### 1195. DAVEL, H. B. (AGRICULTURAL RESEARCH INSTITUTE, PRETORIA).

##### Research in agriculture.

*Fmg S. Afr.*, 1949, 24: 565-71.

This annual report of the Agricultural Research Institute, Pretoria, for 1948-49, contains information on the following horticultural investigations. *Fertilizer trial with Valencia orange trees*: The object of this trial was to determine the fertilizer requirements of citrus trees in the Sundays River Valley. For 9 years, only applications of nitrogen have had any favourable effect on yield. Phosphate and potash had no influence on production or yield. 1 lb. nitrogen, in the form of sulphate of ammonia, per full-grown tree was found to be sufficient for optimum production. Chemical analyses of fruit and leaf samples are being taken to study the intake of nitrogen and phosphorus more closely. *"Stem-pitting" of grapefruit*: It was found that the condition of the parent tree with regard to "stem-pitting" is more or less quantitatively transferred to the daughter trees. *"Greening disease" in citrus and 2,4-D sprays for prevention of fruit drop*: Investigations are being carried out on both these subjects, but no definite results can yet be recorded. *Plant pathology*: An angular leaf spot disease of *Zinnia elegans* is caused by a bacterium which has not as yet been described. A complete study is being made of the disease and its causal organism. Selections have been made from a semi-dwarf variety of zinnia which is highly resistant to the disease.

#### 1196. DYER, R. A. (UNION OF S. AFRICA, DIVISION OF BOTANY AND PLANT PATHOLOGY).

##### Plant pathology problems in the Union.

*Fmg S. Afr.*, 1949, 24: 586-8, 599.



The annual report for the Division of Botany and Plant Pathology, Department of Agriculture, S. Africa, for 1948-49. *Citrus diseases*: Evidence has been obtained that the stem-pitting disease of grapefruit can be spread through the agency of the common citrus aphid (*Aphis tavaresi*). There is also reason to believe that the stem-pitting virus is not confined to grapefruit. It probably links up with the die-back virus of limes in West Africa, for limes infected by aphides from pitted grapefruit showed the typical symptoms of die-back, i.e. extreme stunting, leaf flecking, corky veins and pitting. Stem-pitting, transmissible to grapefruit, has also been observed in the Bailidge Early variety of sweet orange. The extent to which the stem-pitting virus or some other virus is the cause of loss of productivity in other forms of citrus is now being investigated. *Potato diseases*: Two new varieties, the Scottish Seedling No. 914a (12) and the American "Kennebec", both resistant to the common strain of blight, will shortly be generally released.

1197. NAUDE, T. J. (UNION OF S. AFRICA, DIVISION OF ENTOMOLOGY).

**Research on the control of insect pests.**

*Fmg S. Afr.*, 1949, 24: 574-81.

This is the annual report of the Division of Entomology, Department of Agriculture, S. Africa, for 1948-49. The following work is of horticultural interest. *Gladiolus fly*: It has been found that the fly (*Epimadiza nigra*) attacks before the buds begin to open, and spraying with DDT wettable powder should start, therefore, before the buds appear. *Root eelworm*.—In tobacco seedbed experiments, D-D at 60 gal. to the acre gave as good results as Dowfume W40 at the same dosage for control of *Heterodera marioni*. Soil moisture was important for the success of D-D treatments. A fumigating machine has been developed for attachment to a 2-3-furrow plough, which will place and seal the fumigant in the furrow behind each share. *Fruit fly*.—A DDT emulsion was tested for control of fruit fly (*Pterandrus rosa*) on guavas, but gave disappointing results, as did orchard experiments with DDT smoke. Field tests with the new insecticides are being continued. *Mussel scale of citrus*: In spraying trials for control of *Lepidosaphes pinnaeformis*, a kill of 70% was obtained with parathion used at 2 lb. per 100 gal. *Potato eelworm*: Potato tubers infested with *Heterodera marioni* were fumigated with methyl bromide at the rate of 1 lb. to 750 cu. ft. at 60-65° F., but all eggs hatched normally. The methyl bromide burned some of the tubers. Similar experiments will again be conducted during the hot weather.

1198. NEL, R. I. (WESTERN PROVINCE FRUIT RESEARCH STATION).

**Strengthening the fruit industry.**

*Fmg S. Afr.*, 1949, 24: 594-9.

This is the annual report of the Western Province Fruit Research Station, Department of Agriculture, South Africa, the following being but a few items from the wide and interesting programme of research reported: *Agricultural meteorology*: A study was made of the relationship between winter temperatures and pear production in the Groot-Drakenstein Valley. For the period 1940-47, the four months April to July appeared to be critical for pear production, low temperatures favouring high yields. *Plant breeding*:

Observations on 1,000 grape hybrids continue, an important phase of the work being the determination of resistance to Vlamsekte [*Erwinia amylovora*]. Further breeding and selection of grapes, guavas, peaches, pears and strawberries is reported. *Pomology*:—The use of DNC in conjunction with oil sprays to prevent delayed foliation again gave striking results with prunes; not only were yields improved but more fruit spurs were formed. With peaches straight DNC sprays were promising but late pruning still gave the best results. The relative susceptibility of 175 peach varieties to delayed foliation is being studied. A modified system of bark grafting for olives can now be recommended for general practice. Spraying of Waltham Cross vines with 10% winter-oil emulsion increased the percentage of bud strike from 58 to 84. Promising results were obtained with the topworking of mature vines by green-grafting fresh shoots with soft wood scions during blossoming. In fertilizer experiments with vines, the yield of exportable grapes was markedly increased by applications of nitrogen in all treatments, irrespective of fertilizer combination or irrigation. *Fruit storage* tests showed that the optimum storage temperature for Royal apricots was about 32° F. Elberta peaches, treated with 1% acetylene gas and kept at 75° F. for 2 days before being placed in cold store, showed no sign of woolliness on removal from store. When stored at 31° and 34° F. Bon Chrétien pears from oil-sprayed trees ripened normally, whereas fruit from DNC-sprayed trees invariably failed to ripen. DNC sprays had no apparent effect on the storage life of Beurré Hardy, Winter Nelis and Beurré Bosc pears, although ripening was a little slower than that of pears from oil-sprayed trees.

1199. TURPIN, H. W. (UNION OF S. AFRICA, DIVISION OF AGRICULTURAL EDUCATION AND RESEARCH).

**Education and research in agriculture.**

*Fmg S. Afr.*, 1949, 24: 541-55.

This is the annual report of the Division of Agricultural Education and Research, Department of Agriculture, S. Africa, for 1948-49, and contains brief reviews of the work of the various research stations and colleges, among them the following: *Riet River Research Station*: Promising results have been obtained with the chemical forcing of fresh potato tubers. Attention is being given to the propagation of mother seed from new species which can take a place in the Union's potato industry, and the new variety Kennebec is being propagated for distribution. This variety grows sufficiently quickly to enable 2 crops a year to be planted without the necessity for chemical forcing of the seed; it is also resistant to late blight. *Rustenburg Research Station*:—The highest yield of flue-cured tobacco was obtained from seed sown at the end of June or beginning of July under favourable conditions. In an investigation on the merits of leaf curing as opposed to stem curing of light, air-cured tobacco, the return and value per morgen in favour of leaf curing was again significant. Plant breeding work to improve the quality and disease-resistance of tobacco varieties is being continued. A certain measure of success has already been attained in resistance to ordinary mosaic in  $F_1$  crossing. Orinoco varieties of high quality are being used in

crosses to improve the quality of the highly productive Amarelo type. A preliminary experiment was carried out to determine the water consumption of Burley type tobacco in black turf treated with different amounts of fertilizer. Except during the flowering period, water consumption varied greatly with the different applications, the heavy and light applications of fertilizer showing the least total water consumption.

#### 1200. ZANZIBAR PROTECTORATE.

*Annual Report of the Department of Agriculture, Zanzibar, 1948, 1949, pp. 51, Shs. 2.*

Brief accounts are given of work on many crops, among which may be noted the following: *Cashew*: Leaf injection and other techniques are being used to determine possible minor element deficiencies. *Citrus*: A disease, taking the form of galls at the collar and point of bud union, has been observed. *Cloves*: Fertilizer trials did not yield statistically significant results. Investigations on the "Sudden Death" disease, believed to be caused by a virus, are proceeding, and a reasonably reliable grafting technique perfected, which should make it possible to settle the virus question one way or the other. *Cacao*: Seedling Criollo cacao has grown excellently in two areas; in a third progress continues to be poor, except where it is

budded on Forastero stocks. Progress has been made in propagation by cuttings. Leaf injection experiments with trace elements have so far yielded no conclusive results, though there is some indication of a shortage of magnesium. *Other crops*: Among those mentioned are derris, kapok, kudzu (as a cover crop and cattle fodder), oil palms, papaws, roselle hemp (not likely to succeed in Zanzibar), tea, tobacco and tung.

*Noted.*

#### 1201.

##### a CONNECTICUT.

*Twenty-fifth A.R. [for 1946] Tobacco Substation at Windsor, being Bull. Conn. agric. Exp. Stat. 504, 1947, pp. 26 [received 1950].*

##### b *A.R. Dep. Agric., Fiji, 1948, Suva, 1949, pp. 39.*

##### c *17th A.R. Minist. Agric. Dublin, 1947-48, pp. 172+88, 5s.*

##### d UNITED STATES DEPARTMENT OF AGRICULTURE.

*Agricultural Statistics, 1948.*

U.S. Govt. Printing Office, Washington, D.C., 1949, pp. 752.



